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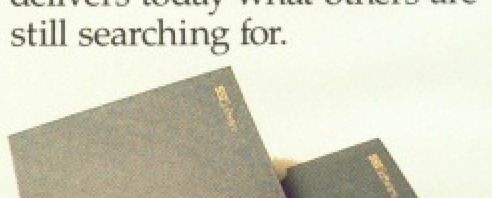
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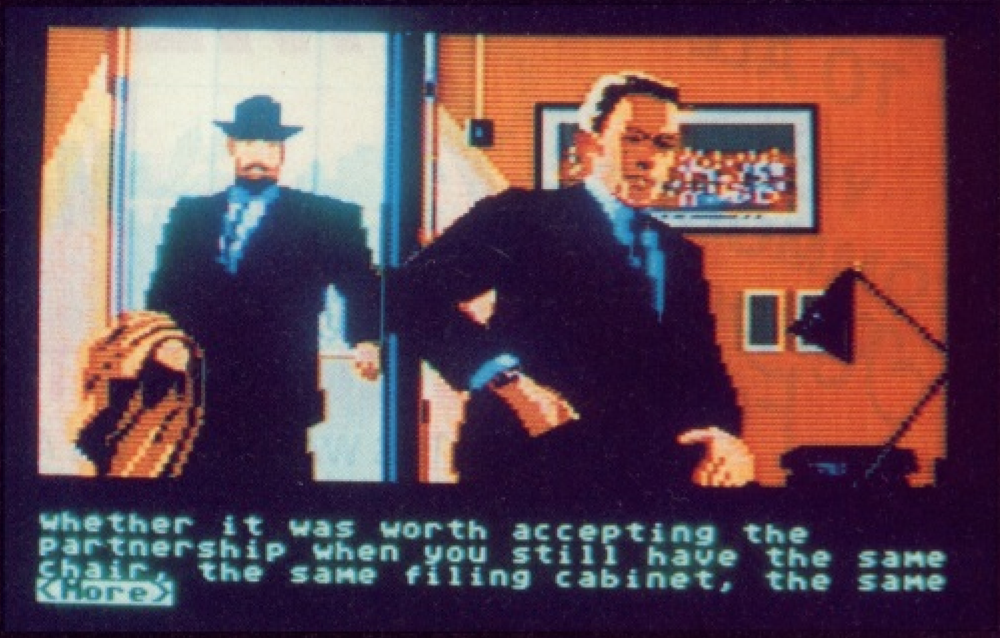
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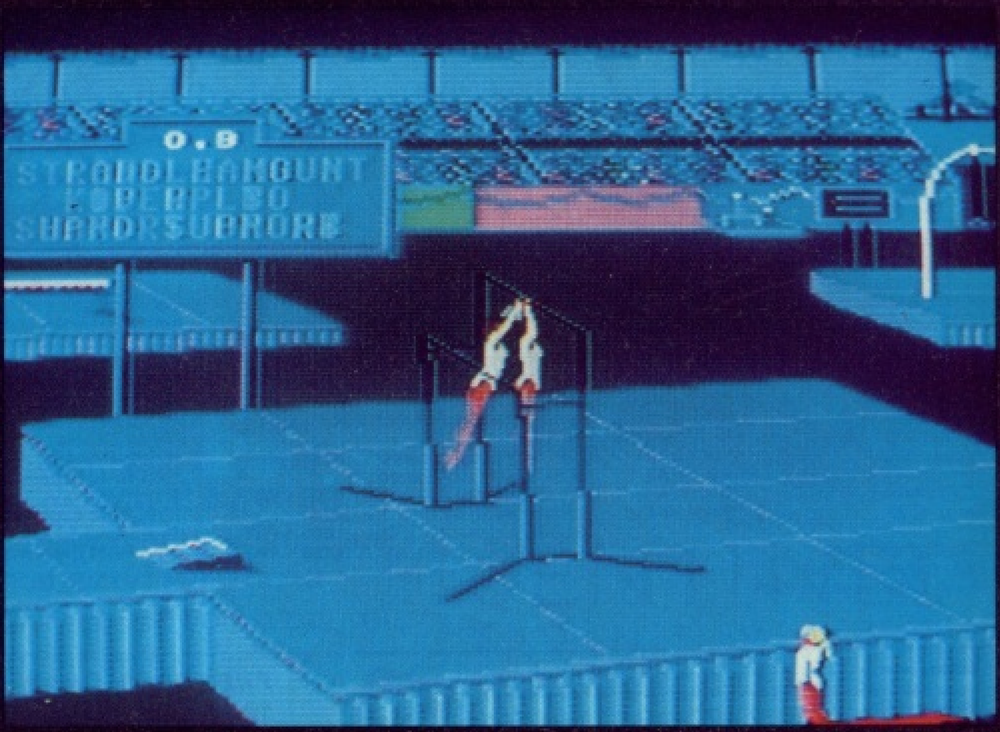
CONTENTS



Corruption



4th and Inches



The Games: Summer Edition

VOLUME 5
NUMBER 4

FEATURES

REGULARS

PROGRAMS

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Technical Editor: *Fin Fahey*
Advertisement Manager: *Paul Kavanagh*
Ad-Copy Control: *Andrew Selwood*
Artist: *Alan Batchelor*
Designer: *Neil Sweetman*
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ABC

Data Statements

Good IDEAS

The Cleveland Information Technology Centre has launched a free, on-line information database system. Called IDEAS for short, the full title is the ITEC Data base, Electronic Access Service.

Designed by the Cleveland ITEC supervisor, Graham Robinson, IDEAS allows users to create their own bulletin boards and electronic information exchange centres through which information can be shared or sought on a variety of subjects. The system has been designed to appeal to specific interest groups, such as teachers, engineers and businesses, but certain areas will offer open access to the general public.

Closed user groups will be required to pay an initial fee for registration charges but future access will be free. The contents of the databases are determined and compiled by the users and any computer/modem combination can be used as long as they support the IDEAS protocol of scrolling TTY, 300/300 baud, seven bits, even parity with one stop bit.

IDEAS can be accessed any time of day or night on (0642) 219704.

***Touchline:** Graham Robinson, Cleveland Information Technology Centre, Sun Alliance House, 16-22 Albert Road, Middlesbrough, Cleveland TS1 1PR. **Tel:** (0642) 232550 Ext 20.*

Bookshelf

With fewer shops stocking a range of computer books, Computer Manuals are ready to supply users' needs by supplying a reasonable range of C64 and C128 books from their latest catalogue. Included in the range are the Commodore 64 Programmer's Reference Guide, Weber System's C128 Programmer's Guide plus the Anatomy books from First Publishing for the 1541 and 1571 disk drives.

***Touchline:** Computer Manuals, 30 Lincoln Rd, Olton, Birmingham B27 6PA. **Tel:** 021-706 6000.*

CDS Attack

At a recent press launch held at the National Army Museum, CDS announced the release of their latest computer boardgame, *Tank Attack*.

The game involves the rivalry between four fictitious countries who decide that the only solution to their differences lies in armed conflict. With the computer acting as moderator and graphic aid, the main action takes place on a playing board, using small plastic tanks and armoured cars. Each player can move pieces around the board according to the computer's movement allowance. Battles can be fought by informing the computer of the weaponry involved, range and nationality of the combatants. Acting on this, the computer displays the fight on the screen and decides the outcome. At the end of each day's fighting, the computer also displays a summary in the form of a newspaper page.

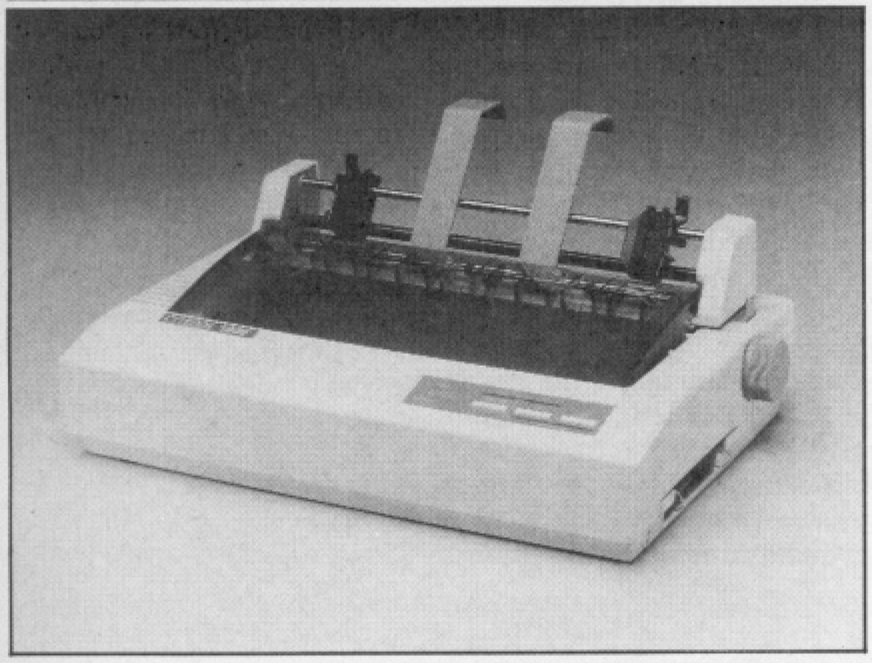
CDS kicked off the computer board game two years ago with *Brian Clough's Football Fortunes* and CDS hope that *Tank Attack* will repeat this success.

***Touchline:** CDS, 44A Beckett Road, Doncaster, S Yorks. **Tel:** (0302) 21134*



An Armanian Tank Attack strikes at the enemy headquarters

New Citizen



The latest Citizen printer for home, small business or education use has been designed and constructed in Britain. With facilities for all of the European and Scandinavian alphabet options, Citizen are claiming that the 180E is a truly European printer.

Supporting the alphabets, the machine also offers two resident typefaces in either draft or NLQ modes as well as the usual variants of italics, boldface, condensed and enlarged styles. The quadruple size printing capability has been enhanced so that double and quadruple height and width can be combined in various ways to produce styles suitable for poster printing.

The printer employs a pull tractor-feed which can be removed to allow single sheets to be used individually in the friction drive, or to be fed in bulk from a hopper which is offered as an optional extra. Awkward paper types, such as address labels, can be used via the special bottom feeder provision.

The Citizen 180E retails for £229 plus VAT.

Touchline: Citizen Europe, *Hellington House, 4-10 Crowley Road, Uxbridge, Middlesex UB8 2XN.* ***Tel:*** *(0895) 72621.*

Integrated Combat

The final stages in producing *F-16 Combat Pilot* were helped immensely when Digital Integration's team had detailed discussions with the chief test pilot for General Dynamics, the manufacturers of the F-16.

Such attention to detail has been one of the parameters for the game's designers but this latest development adds to the invaluable help of Bill Gunston, a respected author on aviation, and puts the seal of quality on the game, in the opinion of David Marshall, Director of

"We are very grateful for the assistance we have received from both General Dynamics and the F-16 pilots. Our game is going to be the closest you can get to flying this awesome aircraft without leaving your room."

F-16 Combat Pilot will soon be available for the C64 on cassette at £14.95 and the disk version will cost £19.95. The Amiga version will follow within the next few months.

Touchline: Digital Integration, *Watchmoor Trade Centre, Watchmoor Road, Camberley, Surrey GU15 3AJ.* ***Tel:*** *(0276) 684044.*

Manager Plus

Fans of *Football Manager2* can now add further enjoyment to the game with Addictive Games' special *Expansion Kit.* With the aid of the kit, saved games can be modified by changing the team names, colours, players' names, sponsors' and the name of the Cup. With a brand new game, additional changes can be made to the starting division of your chosen club, the amount of cash on hand and the points awarded for league wins and draws.

The new program also has saved games for the Scottish, French, Italian and World Leagues and will be released in February. The *Football Manager 2 Expansion Kit* will be available on cassette and disk for £6.99 and £9.99 respectively.

Touchline: Prism Leisure Corporation, *Unit 1, Baird Road, Enfield, Middlesex EN1 1SJ.* ***Tel:*** *01-804 8100.*

Superior McGuigan

Superior Software's latest game, *By Fair Means or Foul,* carries an extra competitive edge for those who can succeed in becoming World Champion. Success qualifies the player for a chance to win a boxing trophy, £200 or a certificate signed by Barry McGuigan.

Barry took time out recently to examine Superior's game which allows sneaky low tactics when the referee isn't looking. Hopefully, this won't influence his clean fighting style. *By Fair Means or Foul* is available on cassette for £9.95 and the disk version costs £11.95.

Touchline: Superior Software, *Regent House, Skinner Lane, Leeds LS7 1AX.* ***Tel:*** *(0532) 459453.*

Clean Machine

Computers and TV or monitor screens seem to attract dirt but finding suitable cleaning solutions can be a problem. Accodata supply a complete cleaning pack which will take care of computers, screens and the disk drive heads, too. The kits come in two varieties, one for 5.25 inch and another for 3.5 inch

The kits cost £15.96 and the screen wipes are supplied in packs which can be attached to the side of the monitor for easy access.

Touchline: Accodata, *Nepicar House, London Road, Wrotham Heath, Sevenoaks, Kent TN15 7RS.* ***Tel:*** *(0732) 885555).*

Mediagenic Move

Activision (UK), the British arm of Mediagenic, have moved from their Hampstead address to Reading. Later in the year, Activision's programmers, Software Studios, will be moving in to the new premises from Southampton.

The new address is Activision (UK) Ltd, Blake House, Manor Farm Road, Reading, Berks RG2 OJN. Tel: (0734) 311666.

Repair Initiative

The South Business Initiative has given a chance for a young company, VSE Technical Services, to set up a new computer repair company. Although Ian Vaudrey and Tim Morris have been repairing computers for some time, their new workshop in the Mercury Asset Management Youth Enterprise Centre provides extra facilities. Explaining these benefits, Ian said, "It provides us with a base with comprehensive back up services such as secretarial, reception, business information and advice. This gives us a chance to concentrate on making a success of our business."

Time Runs Out

The financial problems of the Sport Aid charity has claimed a victim in Code Masters software house. The official computer game which was meant to help the charity has proved as popular as Ben Johnson at a temperance meeting. Not that the game is necessarily bad, indeed many of the reviews have been good, but the higher price of £4.99 which the charity donation necessitated has crippled the sales, according to Code Masters' operations manager, Bruce Everiss.

The game has been dogged by ill-fortune because, prior to the crash of Sport Aid, the cover which depicted Jesse Owen had to be changed to show Carl Lewis in action. Earlier format versions of the game have failed to make much of an impact on the Gallup charts and Code Masters' hopes are now pinned on the success of the C64 version.

***Touchline: Code Masters Software**, Lower Farm House, Stoneythorpe, Southam, Warks CV33 ODL. **Tel:** (0926) 814132.*

Real D&D

SSI's *Dungeon Master's Assistant* is intended to assist players of *Advanced Dungeons and Dragons.*

Using this utility, Dungeon Masters are relieved of the duty of creating and calculating encounters with a wide range of monsters and combatants.

The database contains over 1000 encounters and over 1300 characters and supports monster records and encounters print-outs. The DM can also specify encounters or ask the Assistant to generate random ones. Existing data can be added or modified to suit the user's needs.

The program has been designed to handle most of the number crunching and will also detail armour and weaponry types, number and types of spells, and treasure and experience points gained in each encounter.

Dungeon Master's Assistant available for the C64 but the price has yet to be announced.

***Touchline: SSI**, US Gold, Unit 2&3 Holford Way, Holford, Birmingham B6 7AX. **Tel:** 021-356 3388.*

Dupe Disks

Following the launch of Commodore branded disks by RPS, pirates have moved in to produce lookalike disk boxes containing inferior products. RPS are understandably annoyed about this sharp practise which is potentially harmful to the reputation of the company and its high quality disk.

Commenting on the situation, Ivor Norkett, UK business manager for RPS, said, "Our initial tests show that these pirate disks are totally inferior in quality and performance and any users of no-name or unknown brands are going to experience problems. We will ensure the good names of RPS and Commodore will be protected from this kind of con trick."

Purchasers of Commodore branded diskettes should check to see that the box contains the wording *'Manufactured by RPS'.*

***RPS**, High Street, Houghton Regis, Beds LU5 5QL. **Tel:** (0582) 867222.*

Telesoftware rip

By the time you read this, Telemap, the company that operates Micronet on the Prestel database, should be providing its subscribers with a new telesoftware service. This is both good and bad news.

The reasons for the changes are numerous. Firstly, the major change will be the lack of commercially priced telesoftware. Previously Mironet used to supply software from professional producers such as Firebird, though always on a small scale. It would appear that the decision to abandon paid telesoftware was made partly because of lack of support from these software producers. To an extent, the attitude of the software houses is understandable.

Even with the data protection that the Mustang downloader provides for Commodore software, it's still relatively easy to duplicate a piece of telesoftware once it's on your disk. Further, software is more and more complex; the packaging alone, with comprehensive guides and other items, is very attractive, and those who download telesoftware tend to loose out in this respect.

The second major reason for abandoning paid telesoftware is that code for micros such as the Amiga tends to be on the large side, and so any cost saved by purchasing the product as telesoftware can be lost in the time (and money) it takes to download the item.

In its place is a telesoftware gateway. Micronet won't be charging anything for the software that will be provided, but a time charge of 1p per minute will be levied when using the telesoftware gateway. This time charge will not be applicable between midnight and 8am.

Micronet say the charge is necessary to cover costs, yet this argument is quite ridiculous for several reasons:

Firstly, since the demise of chargable telesoftware, Telemap resources (manpower, time, billing etc) has been de-allocated from telesoftware; this must save the company money.

Secondly, frames of telesoftware used to be stored on the Prestel computer, and frames that had to be rented by Telemap from Prestel. In changing over to a gateway system, Telemap *must* be saving a considerable amount of money.

Thirdly, Telesoftware is a fundamental part of Micronet. It always has been, ever since the service was first opened over five years ago, and it has long been recognised that free telesoftware (free from ALL charges excluding phone costs) was something that the subscription covered.

Surely Telemap with its savings in manpower costs, frame rental and the recent subscription increase could provide the telesoftware gateway as part of its standard service?

The price of fax

As reported in last month's column, Telecom Gold has now provided a fax facility for its subscribers. It's an outgoing text-only service at present, but should still prove useful for those who do not wish to invest in a dedicated machine.

Fax messages are charged by the kilocharacter (or part thereof). One kilocharacter = 1024 characters (approximately 2/3 of an A4 page).

The charge varies according to destination:-

UK destinations	45p
European destinations	85p
North American destinations	£1.20
Rest of the World destinations	£1.50

More information, including an on-line user guide, can be found on Telecom Gold by entering INFO FAX, INFO FAX USERS or INFO FAX COUNTRIES at the chevron.

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Games Update

The industry is beginning to wake like some slumbering giant, just in time for the expected Christmas rush. Most of the major releases were looked at last month in the Games Supplement, or feature in this month's issue. As a result, there are only a couple of titles in this section.

The game likely to attract most attention is *Typhoon* from Imagine. Based on the Konami arcade game, it features multi-level shoot-em-up action. You start off piloting an F-14 fighter bomber pitting yourself against hordes and hordes of oncoming mechanical aliens. The first section looks most impressive as the game is presented in a head-on perspective, but the gameplay sounds all too familiar. As well as blasting the enemy craft, you can shoot down their air-to-air missiles and pick up bigger and better weapons.

At the end of the level, you have to bomb an aircraft carrier into oblivion before being allowed to progress. Then it's all change into a helicopter (why?) for a depressingly familiar top down, vertically scrolling, bomb-the-ground-installations-and shoot-the-enemy-aircraft affair. There are six more levels of this sort of thing, each one having to be loaded in separately so that non-disk owners might find that it all becomes a bit tedious when it is finally game-over time.

Hotshot from Addictive is a curious blend of pinball and breakout action. A two player game, either against the computer or a friend, you have to manoeuvre your man around the bottom of your half of the screen, attempting to catch a ball on the end of your gun. Catch it anywhere else and you're dead. If caught, the ball can be aimed at a series of bricks above your gun or into several assorted bumpers.

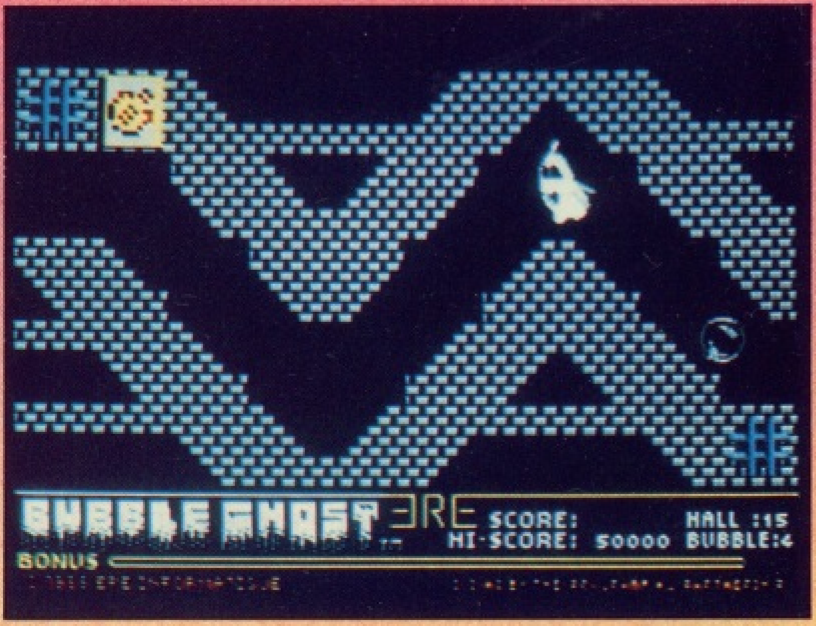
Each level is played against the clock, so it's tough luck if you happen to have a good opponent because you are not going to see enough of the ball to score sufficient points to progress onto the bonus screen and next level. I must confess to being one of the world's greatest pinball,fans and the game has only to be mediocre for me to end up playing it for hours on end. To say that I thought *Hot Shot* was rubbish should give you some idea of my true feelings.

Another duffer comes from the French company Ere International. *Bubble Ghost* is a variant on the old arcade adventure theme. You play a ghost trying to guide a bubble, representing its soul, through a maze of rooms in an old castle. This you do by blowing your soul, rotating your ghost to give you the angle that you require.

Contact with any of the plethora of objects lying around means, not surprisingly, that the bubble bursts. As you progress further, there are puzzles to solve, candles to be blown out, switches to be pulled and that sort of



Typhoon



Bubble Ghost

thing.

The game is very gentle and there are several nice graphic touches, but that does not compensate for a basic lack of interesting gameplay. This was the sort of thing that was around three years ago and the industry has come a long way since then.

Budget Games

Quite a few games this month ranging from the good, through the bad to the indescribably awful. To misquote Dr Johnson, these games are both good and original. Unfortunately, the good ones aren't original and the original ones aren't good!

Worthiest title is, undoubtedly, *The Race Against Time* from Code Masters. Originally written to help with Sport Aid, news has since broken that the company organising Sport Aid has gone bust, owing several million pounds due to the postal dispute. At the time of writing, there is some doubt as to whether the monies donated to charity might all go in paying off creditors, so if you want to make a donation to charity I would suggest that you do so through Oxfam or one of the other agencies.

As for the game itself, you play the African runner Omar Khalifa in an arcade adventure that takes you round the world. You need to persuade people to join in the race by raising a flag and lighting a flame in each of the five continents. There are assorted puzzles en route and over 100 screens to visit.

Ace of Aces on the Kixx label puts you behind the controls of a Mosquito fighter bomber in the Second World War. As well as flying the plane, your missions include attacking V1 rockets, U-Boats and enemy trains. You get fully briefed on your mission and must then decide what weapons you are going to load onto your aircraft, choosing these from a combination of bombs, rockets and cannon.

In flight, you have to flip between pilot, navigator and engineer screens in order to reach the target. The bombardier screen is only necessary once you have the enemy in view. All that remains to be done after destroying your target in this excellent simulation is to fly home and get on with the next mission.

Sports fans could do a lot worse than take a look at *Tenth Frame*, also on the Kixx label. It's a ten-pin bowling simulation in which up to eight players can complete in a league. There are three different skill levels and the release of the ball uses *Leaderboard* – type controls for judging direction, speed and degree of hook. The controls operate by releasing the fire button as a sliding scale reaches the desired point. Anyone who has failed miserably to come to terms with the scoring in bowling will be pleased to know that everything is worked out for you.



The Race Against Time

Another sports program is *Professional Ski Simulator* from Code Masters. This is a reasonable game until you get caught behind an obstacle and it then becomes impossible to see the direction in which you're facing, with the result that it is almost certainly game-over time.

My memories of skateboards are of those things I fell off a lot way back in the 70's. Recently though, there have been a spate of skateboard games. From Code Masters again comes *Pro Skateboard Simulator* (I wonder how much one gets paid for thinking up



Professional Ski Simulator

Code Master's titles). Seven parks, skate round, collect the flags, do a few tricks, beat the clock.

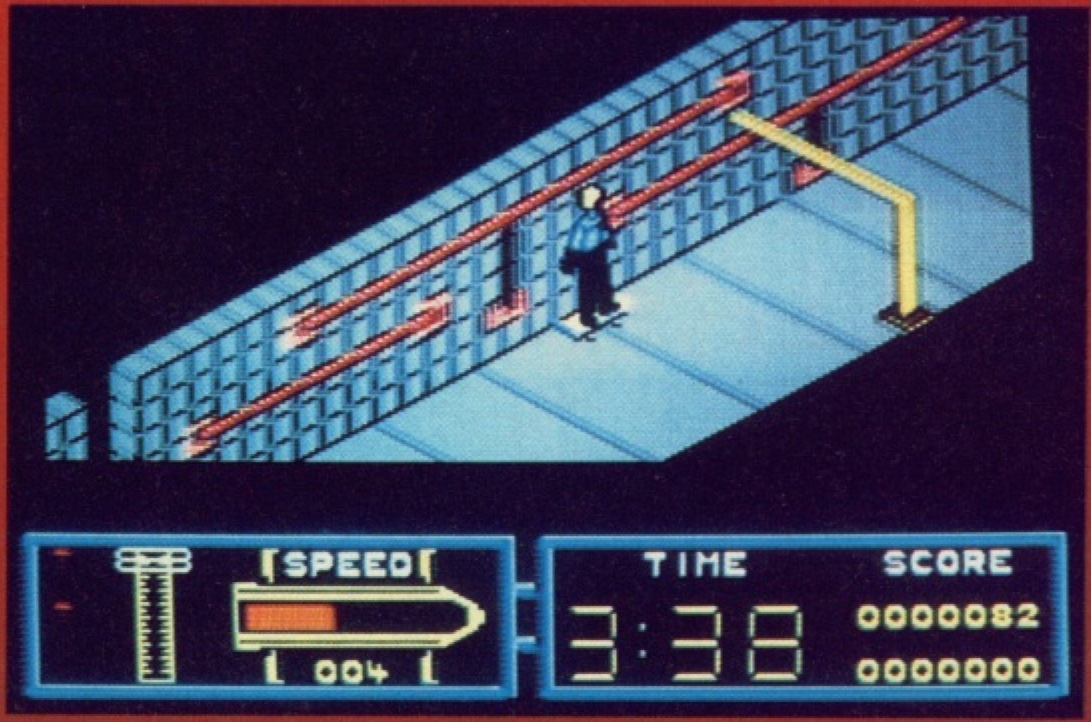
Cheap Skate on the Silverbird label is slightly different – skate down the road, avoid the obstacles, beat the clock, go into the next level, impress the local gang leader. Certainly, I had enough trouble staying on my own board without having to dodge out of the way of malevolent fireballs!

Another blast from the past. Do you remember the Space Hopper? A large orange ball, with ears, that you could sit and bounce down the street for five minutes until you got bored with it and started playing football instead. Well Silverbird have come up with another use for one – bouncing on top of criminals in *Hopper Copper*. Up and down the streets you go, using your radar to catch up with the baddies before splatting them. The only trouble was that the radar in my copy bore no relationship whatsoever to the location of the robbers. Apparently, when right on top of them, there wasn't a burglar in sight.

Now to *Street Gang* from Players. Run through the streets of New York, picking up different weapons and beating up or dodging all the baddies. Seen it all before.

Fighter Pilot on Silverbird is the old Digital Integration title. Getting a bit long in the tooth now, but still very playable if you are looking for a combat/flight simulator at a bargain price.

Pulse Warrior from Mastertronic sees you trying to deflect small pulses of energy into magnifying lenses and then deflecting the resulting, bigger pulses at the aliens before moving on to the next screen. Different but not particularly stunning.



Cheap Skate

The Growing Pains of Adrian Mole, based on the TV series of the book, is available at budget price which now makes it cheaper to buy than the book. Though classed as an adventure, it is little more than a series of multiple choice questions which determine your progression through the story. It's okay to play once but I don't think you'd load it in many more times and I still reckon that the book would give a lot more pleasure.

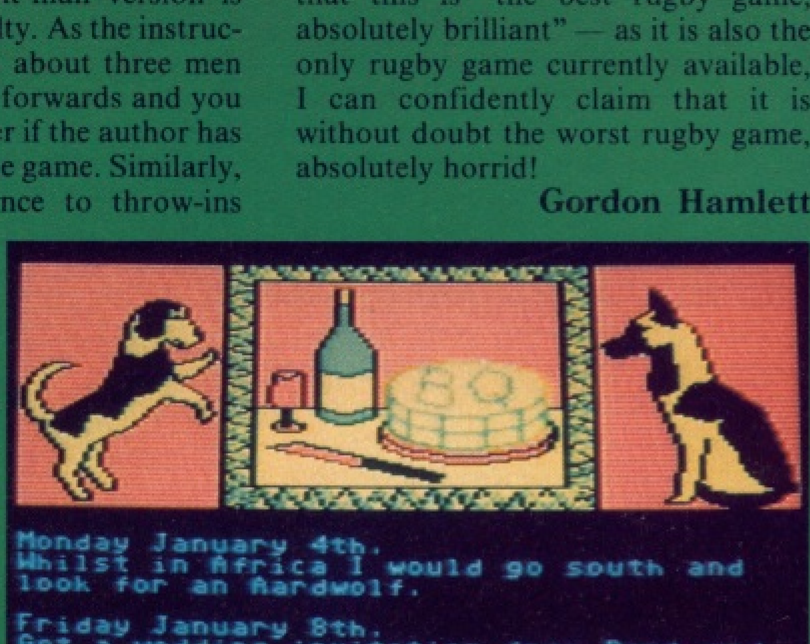
My bozo of the month is *International Rugby Simulator* from Code Masters (you'll soon see why this one wasn't called Pro Rugby Simulator). Normally played with 15 men, there is a cut-down version known as Rugby Sevens, so this eight-man version is something of a novelty. As the instructions go on, it talks about three men in the pack and five forwards and you soon begin to wonder if the author has ever played this noble game. Similarly, the constant reference to throw-ins rather than line-outs makes you wonder which sport this simulator was based on.

You can choose all sorts of different formations for your line up, but this is something of a waste of time as it is nigh on impossible to tell which of your men is highlighted and therefore under your control. This is especially true when your side is France wearing their well-known national colours of green. Inevitably, when you do discover which man you are controlling, he is never in the right position and you soon discover that the opponents have run in yet another try. A quote on the packaging claims that this is "the best rugby game, absolutely brilliant" — as it is also the only rugby game currently available, I can confidently claim that it is without doubt the worst rugby game, absolutely horrid!

Gordon Hamlett



Pulse Warrior



The Growing Pains of Adrian Mole

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Byting Into the 6510

To tie up our series on programming in machine language we look at some useful arithmetical techniques, and 6510 bit instructions and also find out about NOP and BRK

By Burghard-Henry Lehmann

In this final article of the series, I'd like to tie the subject up by dealing with a few techniques and some instruction which I haven't dealt with in the previous articles.

Most of these techniques concern 16-Bit arithmatic – an area in which the 6510 is notoriously weak.

Adding and Subtracting 16-Bit Numbers

Listing 1 shows you how two 16-Bit numbers can be added together.

This works by first clearing the carry flag and then adding the low bytes and the high bytes of the two numbers respectively.

If one of the two numbers is 8-Bit you can use the method shown in Listing 2 or you can give the low byte as zero and add it to the low byte of the second number, using the method shown in listing 1.

Subtracting two 16-Bit numbers is done in a similar way, as you can see from listings 3 and 4. Only now the carry flag has to be set with SEC, as usual.

If you use the method demonstrated in listing 3 and if the result of the subtraction would be negative, that is, the first number is smaller than the second number. This will be shown by the carry flag being clear at the end of the routine.

Shift and Rotate Instructions

Before I deal with multiplication and devision I'd like to deal briefly with a range of 6510 instructions which I haven't touched at all in this series of articles – the so called bit instructions.

These instructions allow you to manipulate the binary bits separately. As such these instructions are extremely useful for high resolution graphics when you want to manipulate each pixel on the screen separately.

But you can also use some of the bit instructions for some arithmetical purposes, as we will see in a minute.

The most frequently used bit instructions are ASL, LSR, ROL and ROR, which are also called the shift and rotate instructions.

Figure 1 — ASL

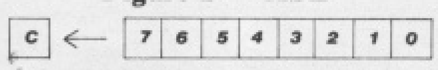


Figure 2 — LSR

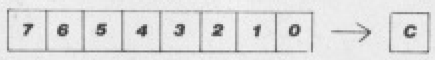


Figure 3 — ROL

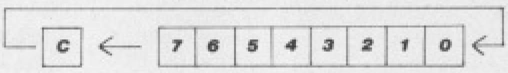
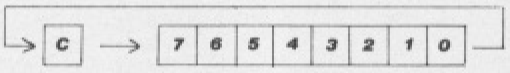


Figure 4 — ROR



ASL shifts the bits within a byte which is either in the accumulator or in memory to the left, as shown in figure 1. In arithmetical terms this has the effect that the byte is doubled each time ASL is used.

LSR does the opposite, by shifting the bits to the right, as shown in figure 2. In arithmetical terms this has the effect that the byte is halved each time LSR is used.

One way to use ASL or LSR in graphics, is for a routine which scrolls pixels to the left or to the right respectively. In this way you can get extremely sophisticated looking results.

There are two instructions which rotate the bits right round the byte. That is, the bit which is rotated out on the one side of the byte is rotated back in on the other side. It is as if the byte is the window on an endless conveyor belt.

ROL does this action to the left, as shown in figure 3. In arithmetical terms it too doubles the contents of a byte, but has the advantage, that an overflow is shown in the carry bit. This makes this instruction, and the following one, especially useful for multiplication and division, as we will see later on.

ROR rotates the bits to the right and therefore does the opposite of ROL. In arithmetical terms this has the effect that a byte is halved.

The Logical Instructions

The 6510 instruction set includes three logical instructions: AND, ORA and EOR.

These instructions are useful in graphic routines when you want to manipulate single pixels on the screen. Initially you bring the bit you want to manipulate, into the right position by using a shift or a rotate instruction and the you AND, OR or EOR the byte, according to the result you want to achieve.

With AND the result is 1 if both bits are 1. If either or both bits are O, the result is O. That is:

0 AND 0 = 0
0 AND 1 = 0
1 AND 0 = 0
1 AND 1 = 1

For example:

	10010010
AND	10110011
gives	10010010

With ORA (logical OR) the result is 1 if either bit is 1. That is:

0 ORA 0 = 0
0 ORA 1 = 1
1 ORA 0 = 1
1 ORA 1 = 1

For example:

	10010110
ORA	10110011
gives	10110111

EOR (exlusive OR) works like ORA, except for one: 1 EOR 1 gives 0, and not 1. Thus:

0 EOR 0 = 0
0 EOR 1 = 1
1 EOR 0 = 1
1 EOR 1 = 0

For example:

	10110110
EOR	11100101
gives	01010011

EOR gives several interesting results. If you EOR a number with 0 you get the same number as result.
For example:

EOR	00000000
gives	10110110

If you EOR a number with the same number you get 0 as result. For example:

	10110110
EOR	10110110
gives	00000000

EOR has an extremely useful property which allows us to make a number disappear by masking it with another number, and then making the same number re-appear by masking the result again with the same mask. For example:

1st number	10101101
2nd number or mask	EOR 01101000
gives	11000101
2nd number or mask	EOR 01101000
gives again	10101101

The BIT Instruction

Finally there is the BIT instruction which tests memory bits. It changes nothing but has an effect mainly on the zero flag.

Thus, if two bits correspond the zero flag is set. If they don't the zero flag is clear.

As I've mentioned before, all the above instructions are most useful if you want to do high resolution graphics or re-design the character set or design a microprint routine which gives you more characters in a column than the usual 40 characters and so on.

Multiplication and Division

But there are also some uses with multiplication and division.

This is useful to know because the 6510 has no multiplication or division instructions. Thus, if you want to do multiplication or division you have to write your own routines.

If you simply want to double a byte, you can do so easily by shifting or rotating it to the left with ASL or ROR respectively.

If you want to half a byte you can do that by shifting or rotating it to the right with LSR or ROR respectively.

Listing 5 gives you a routine which lets you multiply to single bytes and gives you a 16-Bit result. Put the first number into zero page 252. You'll get the result of the multiplication in the same two locations.

This routine uses a branch instruction and a flag which we haven't dealt with: BPL, which branches if the negative flag is clear.

The negative flag of the flag register tells if the result of a subtraction or comparison is negative or not. It is set if the result is negative, that is, between 128 and 255. And it is clear if the result is positive, that is, between 0 and 127. (In the second article of this series I have briefly explained that in 8-Bit arithmetic a number between 0 and 127 is considered positive, while a number between 128 and 255 is considered negative.)

BMI is the opposite branch instruction to BPL. It branches when the negative flag is set.

Listing 6 gives you a routine which devides a 16-Bit number by a 8-Bit number. You put the 16-Bit number into zero page locations 251 and 252 and the 8-Bit number into 253. The result which is assumed to be 8-Bit will be in 251, with the rest in 252.

If you want to multiply or divide two 16-Bit numbers and get a 16-Bit result you'll have to do it the hard way and construct a loop which adds or subtracts by how many times you want to multiply or divide.

Comparisons

Comparing 8-Bit numbers is no problem. If you want to compare two 16-Bit numbers the trick is to semi-subtract the two numbers from each other. Listing 7 shows you how to do that.

The result of the comparison is given with the status of the zero and the carry flag. If the zero flag is set, both numbers are equal. If the carry flag is clear, the first number is less than the second. If the carry flag is set, the first number is larger than the second.

Thus BEQ, BCC and BCS test for =,< and > respectively.

Last Instructions

Finally I'd like to deal with two instructions which I haven't mentioned so far, NOP and BRK.

NOP does absolutely nothing, except waste time.

This sounds pretty useless, but there are occasions where you want to use NOP. Either you want to waste time on purpose, in order to hold a printout on the screen for long enough for the user to read it. NOP has the advantage that you can time your wasting of time very precisely. It may therefore also be useful in timing routines in games, etc.

Sometimes NOP can also be useful if you want to temporarily substitue some instructions without changing the locations of the subsequent instructions. This is useful for debugging purposes.

BRK is also used mainly as a debugging device. Whenever it is used the 6510 jumps to the reset routine of the computer. This is similar as if you press RUN/STOP and RESTORE simultaneously.

By changing the vector at $0316 and thus making it jump to your own break routine, you can make the computer jump to wherever you want to whenever BRK is used.

This fact is used by most machine code monitors – whenever BRK is given, the program flow jumps back to the monitor.

As I've said, BRK is useful for debugging purposes. It allows you to interrupt a routine at which ever point you want to in order to see what it has been done so far. For this BRK is more useful than RTS, because if you want to break in the middle of a subroutine, a temporary RTS will only return you to the main program, while BRK will get you right out. YC

Listing 1 – Adding Two 16-Bit Numbers

```
CLC
LDA low byte 1
ADC low byte 2
STA low byte 2
LDA high byte 1
ADC high byte 2
STA high byte 2
```

Listing 2 – Adding an 8-Bit and a 16-Bit Number

```
CLC
LDA low byte 1
ADC low byte 2
STA low byte 2
BCC no high byte
INC high byte of second number
```

Listing 3 – Subtracting Two 16-Bit Numbers

```
SEC
LDA low byte 1
SBC low byte 2
STA low byte 2
LDA high byte 1
SBC high byte 2
STA high byte 2
```

Listing 4 – Subtracting an 8-Bit Number from a 16-Bit Number

```
SEC
LDA low byte 1
SBC low byte 2
STA low byte 2
BCS no high byte
DEC high byte of second number
```

Listing 5 – Multiplying two 8-Bit Numbers wit6h a 16-Bit Number as result

```
        CLC
        LDA   0
        LDX   8
LOOP    ROR
        ROR 251
        BCC SKIP
        CLC
        ADC 252
SKIP    DEX
        BPL LOOP
        STA 252
        RTS
```

Listing 6 – Division of an 16-Bit Number with a 8-Bit Number

```
        CLC
        LDX   8
        LDA 252
LOOP    ROL 251
        ROL
        BCS SKIP1
        CMP 253
        BCC SKIP 2
SKIP1   SBC 253
        SEC
SKIP2   DEX
        BNE LOOP
        ROL 251
        STA 252
        RTS
```

Listing 7 – Comparing two 16-Bit Numbers

```
SEC
LDA low byte 1
SBC low byte 2
STA tempstore
LDA high byte 1
SBC high byte 2
ORA tempstore
```

List of instructions explained in this article

ASL = shift content of accumulator or memory to the left

LSR = shift content of accumulator or memory to the right

ROL = rotate content of accumulator or memory to the left

ROR = rotate content of accumulator or memory to the right

AND = logical AND
ORA = logical OR
EOR = logical exclusive OR

BIT = test memory bits
BPL = branch if negative flag is clear
BMI = branch if negative flag is set

NOP = no operation
BRK = force break

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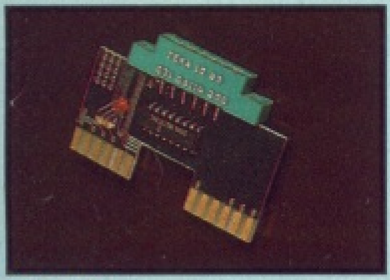
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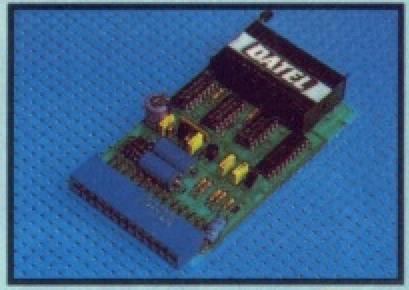
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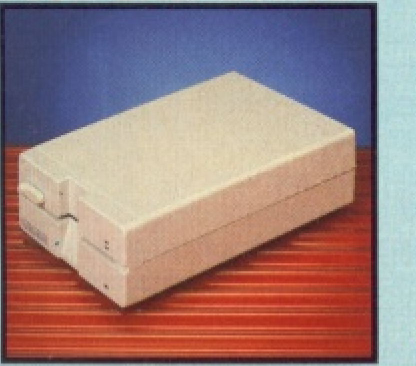
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Captain Blood

Your energy is ebbing away, time is running out, and only the missing clones can save you...





Bob Morlock is desperate. He has just received his quarterly royalties cheque (which came to only 35c) and needs money fast. After a hasty meeting with Charles Darwin in a bar in Slick City, Bob sets out to program an alter ego called Captain Blood, and compiles a giant ship called the Ark complete with his own bioconsciousness. When the program is completed, Bob presses RUN and disappears only to reappear on the Ark, just left of Andromeda, as Captain Blood.

No sooner has he realised what has happened when aliens attack, forcing him into hyperspace, where things begin to go seriously wrong. Suddenly, there are 30 clones of Captain Blood spread throughout the galaxy, with the real one beginning to degenerate through loss of fluid. His only chance of survival is to track down the clones and absorb their bodily fluid. As the game begins, all but five have been absorbed and it's up to you to complete the mission.

Unfortunately, the galaxy is a big place, containing over 32,000 planets, and so the subtle approach of blasting every planet in sight won't work in time. Instead, you'll have to boldly go and seek out intelligent life in an attempt to find out where those duplicates are before it's too late.

The Ark's controls are activated by a touch of the finger, which is just as well because you're pretty low on fluid these days, with enough control left to guide your ship around the hyperspace lanes of the galaxy, but not enough to land on the planets yourself. But a nifty bit of genetic engineering and a little brainwashing provides you with a supply of baby Ororrxs that will, with your guidance, run the gauntlet of planetary missile defences and fly along narrow canyons to make contact with the aliens below.

If your reactions aren't up to scratch, then the poor baby will be splatted against the canyon wall. Don't fret though – there'll be another one along any minute on the birth ramp. Should you make contact with the aliens, you then enter the main part of the game as you attempt to talk to them through a series of common language icons that appear on the screen. However, some aliens are more intelligent than others, and sometimes you'll get no further than FOOD and KILL.

Others may have information but will want to bargain for it, which usually means tracking down and destroying an enemy for them – but their enemy might make a better deal. And so, as you steadily deteriorate, you trade desperately with anyone and anything in the hope of a lead. Eventually this will come, and you'll be able to teleport the first clone into the Fridgerium and absorb him. If not, your arm will start to shake as you become weaker and weaker.

Captain Blood first appeared on the Atari ST in the summer, and became the game that you bought an ST to play. Obviously, the C64 version lacks the stunning graphics of the original, reducing the fractal flying sequences to line-drawn boredom, but there's enough left in the rest of the game to make it interesting and challenging.

It's certainly different, and music from Jean Michel Jarre adds to the atmosphere as you race against time to absorb the final clones. This is not a game for the faint-hearted.

TH

Touchline:
Title: *Captain Blood.* ***Supplier:*** *Infogrames, Mitre House, Abbey Road, Enfield, Middlesex, EN1 2RQ.* ***Tel:*** *01-360 9119* ***Machine:*** *C64/128.* ***Price:*** *£14.95 (disk).*

Basic Explored

Understanding how Basic works can bring memory saving benefits

By Paul Eves

Beginners All-purpose Symbolic Instruction Code or BASIC for short, was originally introduced so that ordinary people could have access to a simple-to-learn and easy-to-use programming language. To this end the language has been 100% successful. However, it does have certain limitations, particularly the version implemented on the C64. The idea of this article though, is not to run down the language, but to try to give a better understanding of its structure within the computer's memory, with some hints and tips on how to get the most out of the limited amount of memory available for your programs.

Code In Memory

When you're typing in your program, you may wish to view a particular section of it at some time. To do this you give the instruction LIST, and immediately the program begins running past your eyes from start to finish. Obviously, what you see on the screen and what's in the computer's



FIGURE 2

Remember, all the values you see here are in hexadecimal notation, not decimal. If you look in the *Your Commodore Serious Users Guide,* there is a conversion table if you wish to convert to decimal.

```
MEM    HEXADECIMAL NOTATION AS  ASCII OF 0828: 4C 4C 4F 20 45 56 45 52'LLO EVER
ADDR    REPRESENTED IN MEMORY   HEX'IMAL 0830: 59 4F 4E 45 22 00 42 08'YONE".B.
                                         0838: 28 00 81 41 B2 31 A4 32'(..A.1-2
0800: 00 17 08 0A 00 97 35 33'......53 0840: 35 00 48 08 32 00 82 00'5.H.2...
0808: 32 38 30 2C 31 3A 97 35'280,1:.5 0848: 5B 08 3C 00 99 22 45 4E'[.(.."EN
0810: 33 32 38 31 2C 32 00 20'3281,2.. 0850: 44 20 4F 46 20 44 45 4D'D OF DEM
0818: 08 14 00 99 22 93 22 00'....".". 0858: 4F 22 00 63 08 46 00 89'O"...F..
0820: 36 08 1E 00 99 22 48 45'6...."HE 0860: 37 30 00 00 00 ........'70.....
```

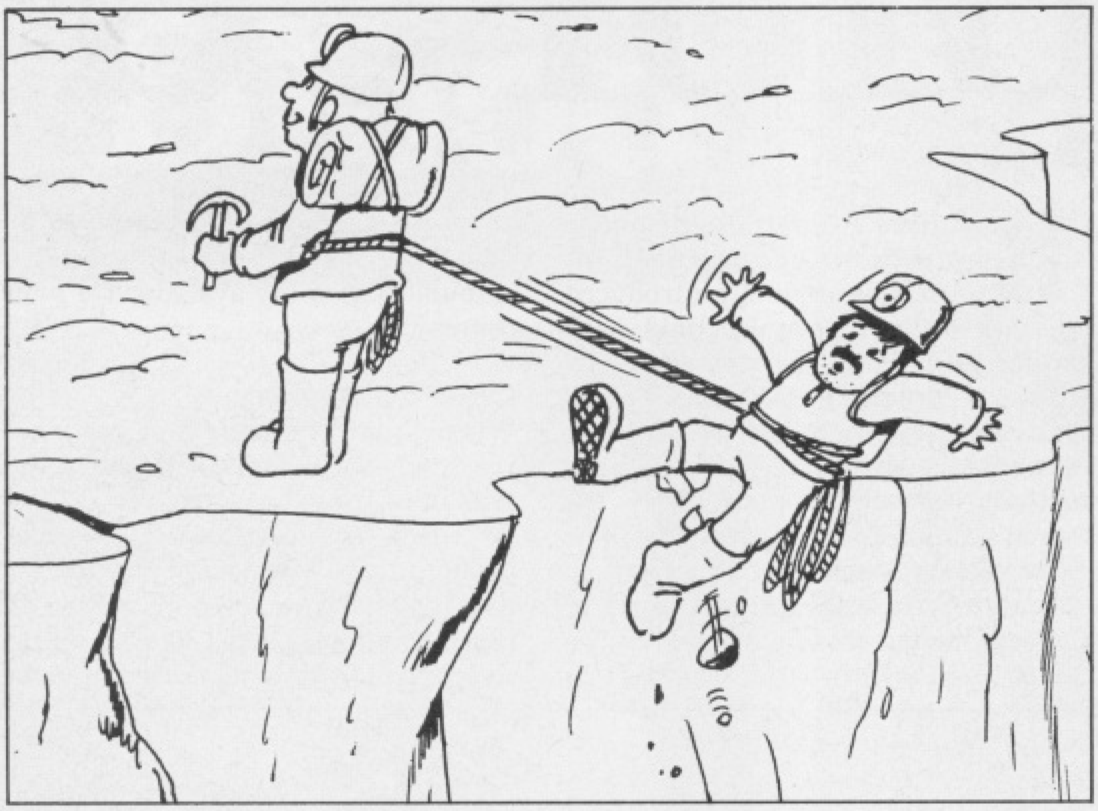


FIGURE 1

```
10 POKE53280,1:POKE53281,2
20 PRINT"[CLR]
30 PRINT"HELLO EVERYONE"
40 FORA=1TO25
50 NEXT
60 PRINT"END OF DEMO"
70 GOTO70
```

memory are two different things altogether. Indeed, the lines flashing past your eyes have undergone many changes on their journey from memory to screen. So just how do we get to view the program in memory? On power up the default setting for the start of Basic memory is $0801 (2049 decimal). So to view let's say the first 50 bytes of memory, you would type something like the following:-

```
FORA=2049TO2099:PRINTPEEK(A);:NEXT
```

This would be done in direct mode. What you would now see is a series of decimal numbers in the range 0-255. These numbers are the decimal equivalents to the hexadecimal numbers that are stored in memory. These hex numbers are the machine's interpretation to what you typed on the keyboard. To give you a better understanding of this, look at figure 1. This is a simple seven line Basic program. Now look at figure 2. This is how that seven line program is stored in the computer's memory. I shall now explain how the program is made up line by line.

Each and every Basic line has an overhead of five bytes, plus the line itself. These five bytes consist of a link address, line number and a trailing zero byte which denotes the end of a line. The link address is used by the system when you're using the screen editor, that is to say, when you are inserting or deleting lines of a Basic program. They are ignored when the program is running (more about the link addresses later). Now back to our short example.

So what does all this mean? The first question that may spring to mind is: how does the computer know how to pick out the *command* words? The answer is simple. Command words, or keywords as they are called, have hex values in the range $7F to $CB. When you press the return key, the data is sent to the keyboard buffer for interpretation. A look-up table is then used and your line is scanned for the keywords. The more observant of you will now be asking yourselves: What if I type PRINT"PRINT"? Wouldn't this be interpreted as two print statements? The answer is no – one of the jobs of the look-up table is to check on the quotes mode. If a keyword lies between quotes, then it must be within a print statement. Back to our little example.

Memory address $0800 contains $00. For Basic to operate correctly, the memory address immediately before the start of Basic memory must contain a zero byte. The next two bytes contain $17 and $08. These bytes represent the link address in the usual low byte/high byte format, and tell the computer where the next Basic line starts from. The next two bytes show $0A and $00: this is the line number shown once again in the low/high byte format. The next byte is $97. Remembering what I said about keywords falling in the range of 7F and CB, you'll realise that this is a keyword – in fact it's the hex notation for POKE.

The following five bytes represent the number 53280. The following byte is $2C, which is interpreted as a comma. Look at the rest of the example, and see if you can follow it through line by line. At first it may seem strange to you, but with practice it should become clearer (it would help you to have a table of the C64 tokens handy).

End of the Lines

You may be wondering how a computer knows when it reaches the end of a Basic program. Remember

that link address I mentioned? Well, if the link address contains a double zero byte, then that marks the end of the program. As a matter of interest, if you want to know where the start and finish of a Basic program you can always peek into the following locations $2D/2E and $2B/2C. These zero page locations are known as VARTAB and TXTTAB respectively. Going back to our example, if you look at figure 2, you'll see that location $0862 marks the end of our little demo program. If you count the number of bytes, you discover that this short seven line program takes up 97 bytes.

As you can see, Basic consumes memory very quickly. So what can we do to get the most of the available memory? As you may know, all the keywords can be abbreviated. In most cases this means typing the second letter only in shifted mode. Occasionally, you need to type the first two letters, then the third as shifted. The one exception to this rule is the PRINT statement: this can be abbreviated by the ? key.

For example,?"HELLO" is the same as PRINT"HELLO". Likewise **P** followed by a shifted **O** is the same as POKE (again the user guides give a full list of abbreviated keywords). So why does this help us? Well the less number of lines you have in your program, the less number of bytes you take up. Remember, each line has an overhead of five bytes plus the line itself.

The reason for using shifted keywords is that although the screen editor on the 64 is perhaps the best there is, it does limit us to only 80 characters per program line (that is, two screen lines). Therefore, by using shifted keywords we can squeeze more instruction onto any program line. The second way of gaining more memory is by putting more than one instruction on a line. The best way of demonstrating this is by example – figure 3 is our seven line demo retyped incorporating the two above tips. Figure 4 is the new method of storing it in memory.

Remember that in reality, all the keywords are abbreviated, but for clarity are shown as normal.

Now if you count up the number of bytes, you'll see that it comes to 73. So already we have made a saving of 24 bytes, and that's only on a very short program. Imagine the savings you could make on a large scale program!

FIGURE 3

```
10 POKE53280,1:POKE53281,2:PRINT"HELLO
EVERYONE":FORA=1TO25:NEXT:PRINT"END OF
DEMO"
20 GOTO20
```

FIGURE 4

```
MEM    HEXADECIMAL NOTATION AS   ASCII OF
ADDR    REPRESENTED IN MEMORY    HEX'IMAL

0800:  00 43 08 0A 00 97 35 33  '.C....53
0808:  32 38 30 2C 31 3A 97 35  '280,1:.5
0810:  33 32 38 31 2C 32 3A 99  '3281,2:.
0818:  22 93 48 45 4C 4C 4F 20  '".HELLO
0820:  45 56 45 52 59 4F 4E 45  'EVERYONE
0828:  22 3A 81 41 B2 31 A4 32  '":.A.1-2
0830:  35 3A 82 3A 99 22 45 4E  '5:.:."EN
0838:  44 20 4F 46 20 44 45 4D  'D OF DEM
0840:  4F 22 00 4B 08 14 00 89  'O".K....
0848:  32 30 00 00 00 00 00 00  '20......
```

Variable Lengths

Another area where we can save on memory is our variables. It's important to know what types there are, how they are made up, and most important of all, how they are stored in memory.

There are three types of variables allowed in Basic – string, integer and real. If you include function names, there are four. String variables have the dollar sign after the name, integer have the percent, and real have nothing. The default value is real. At this point, I will assume that you know how to make up a variable, and the rules on what you can and cannot include in the name. Our main aim is to see how they are stored in memory.

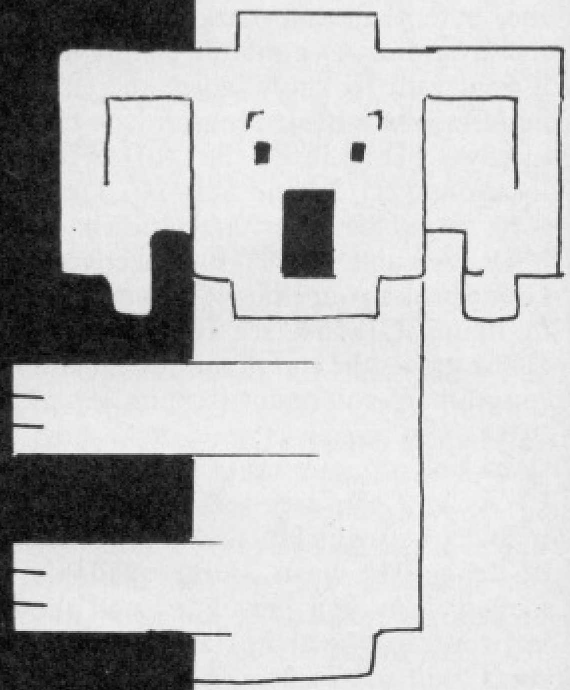
All variables are stored immediately after the Basic program in memory, and are also stored in the order of creation. Strings, however, have two pointers. One is the address of the string, and the other is the string's length. Strings are also stored at the top of Basic memory, and work downwards. Variables are either *simple* or *subscripted*. Simple variables use an overhead of seven bytes, made up as follows:-

The first two bytes hold the variable name. For strings, the next byte holds the length of the string, the next two its pointer in low/high format. The remaining two are unused. Integers use bytes three and four for sign and value, with the remainder unused. Real uses byte three as its expression, with bytes four to seven as its sign and mantissa. A function also uses seven bytes, the third and fourth point to the definition, the fifth and sixth point to its variable, and byte seven its initial value. Subscripted variables, unlike the simple ones, only require the associated values for storage. For example, string subscripts only require three plus the length. Integers only need two.

Earlier on, I talked of ways of securing yourself as much memory as possible by using abbreviated keywords and putting as many instructions on one line as possible. Well here's one or two hints on how to make your Basic program run a little quicker. The obvious one is that the less line numbers there are, the quicker the program will be. Secondly, ensure that all important variables are declared early on in the program. This will save look-up time. Third, try not to have thousands of GOTO's or GOSUB's – all that going and returning takes time. Finally, if you have lots of DATA, put it at the *front* of your program. This will save time on each READ.

I hope that this article has helped you to understand just how Basic is stored. Remember that the best way of learning is through practice, so get yourself a machine code monitor, and start looking around. It will surprise you just how much knowledge you gain by poking and peeking around memory.

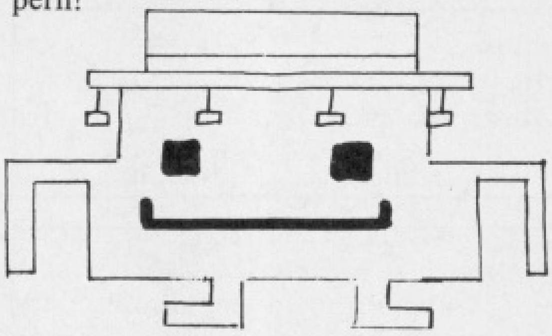
Prefab sprites



Sprites will be sprouting out all over with this utility from Down Under

Most sprite editors operate on Bank O only but this one's different because it will edit anywhere in memory. Even the RAM under the VIC and SID ROMs are open for use, as well as the space underlying the Basic and Kernal ROMs. Normally, the only way to design sprites under VIC is to work in Bank O and then relocate them by programming.

In addition, each sprite can be flipped, reversed and copied but there's one area that the sprite can't be placed. The area up to $2000 is occupied by the program code, change this at your peril!



Once the listing has been typed in, the program can be run by the Basic RUN command or SYS 2067. This will show the sprite-scanning screen where the current sprite can be viewed or a memory scan can be executed by jumps of 16 sprite blocks or one by one.

After typing in the listing save it onto a spare disk or tape. When the program runs it will automatically save out the actual sprite editor so have a master tape or disk ready in the drive.

Commands

+	Increment sprite
-	Decrement sprite
SHIFT +	Increment by 16 sprites
SHIFT -	Decrement by 16 sprites
M	Select multicolour mode
H	Select hi-res mode
R	Reverse sprite
X	X-flip (see =)
Y	Y-flip (see =)
=	X and Y do a bitwise flip which can mix up the colours, this will equalise the result.
K	Kill sprite (clear)
SHIFT U	Scroll sprite up
SHIFT D	Scroll sprite down
SHIFT L	Scroll sprite left
SHIFT R	Scroll sprite right
F1	Memorise sprite
F3	Copy memorised sprite to current sprite position
1	Increment sprite colour

SHIFT 1	Decrement sprite colour
2	Increment multicolour 1
SHIFT 2	Decrement multicolour 1
3	Increment multicolour 2
SHIFT 3	Decrement multicolour 2
4	Increment background colour
SHIFT 4	Decrement background colour
5	Increment border colour
SHIFT 5	Decrement border colour
L	Load — after which: Press RETURN to enter the filename or SPACE to toggle between tape and disk before pressing RETURN. Enter the filename and press RETURN again to start the load
S	Save — after which: Use + or - to select the start address and press RETURN. Repeat the procedure for the end address. Use SPACE to toggle the save device. Press RETURN again and enter the filename followed by RETURN to complete the save

V	Toggles key repeat speed
F7	Re-run editor
F8	Quit
RETURN	Enters or leaves editing screen
CRSR	Moves cursor about within editing screen
*	Plots a point in hi-res mode
1-3	Plots colours 1-3 in multicolour mode
SPACE	Unplots a point

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Corruption





Any comedian in desperate need of a laugh has only to mention the magic word 'yuppie' and the audience starts to fall about. But who are we to mock? Anyone who pours thousands of pounds into those ailing German car manufacturers, Porsche, or tiny dog kennels masquerading as penthouse flats in docklands deserves considerable sympathy. Nevertheless, there are considerable killings to be made in the city, in more ways than one.

Corruption is the latest adventure game from the pens of Magnetic Scrols. After two excellent games, *The Pawn* and *Guild of Thieves*, I did not enjoy their last effort *Jinxter*, very much and so I was interested to see whether that was going to be a one-off or whether the decline would continue.

The first thing that you notice is that the storyline is very different from anything that has gone before. The humour and quirky jokes have all disappeared. Everything here is deadly serious.

On the face of things, your future prospects couldn't be rosier. You have just been promoted to a full partnership in your company and can expect a corresponding increase in your lifestyle. The only thing wrong at the moment is a grotty office and a secretary who can sour milk with a single look.

Then everything starts to fall apart. You discover, or rather heavily suspect that your wife is having a torrid affair with your partner, although this is vehemently denied. The serious fraud squad are called in and you are accused of insider dealing, trafficking in drugs and sundry other offences. Basically, you have been set up, framed, and you have no idea why.

Whoever has done it to you, though, has done a pretty thorough job; and you soon discover that no-one is going to believe your excuses. You are going to have to prove your own innocence and that means that you will have to fight dirty. Very dirty indeed.

The key to your salvation is information. Everybody has their price or some little skeleton in their cupboard that can be used as a lever. All you have to do is discover where to apply the pressure. Useful commands here include asking or telling someone about something and following them to discover their daily routine.

Part of the packaging goes to show just what you're up against. Included is a cassette that, on one side, has a recording of your meeting with the boss just as he informs you of your promotion. On the reverse side is the same conversation judiciously edited so that you have just given what amounts to a full confession.

The written part of the documentation comes on filofax pages (what else?), along with assorted pages containing useful telephone numbers of characters within the game and details of appointments. There are also Magnetic Scroll's enciphered hints – you can get a clue by typing in a whole series of seemingly random letters but whether the information obtained is useful or not is another matter. If you don't feel the need to cheat, at least you can't stumble across the information accidentally.

The parser is by and large excellent although there are a few minor quirks, mainly involving getting to grips with some of the more complex commands. For example, if you open the cabinet in your office and examine it, you discover a ledger and a share certificate. If you now type 'get all', you are curtly informed that you don't see anything there even though you have just found it. You would need to type 'get all from the cabinet'.

Not every location is illustrated but those that do exist are of a reasonable quality, although I found it very difficult to be objective after having played the Amiga version. There are a number of graphic options available, from none at all, through small cameo pictures, to full illustrations.

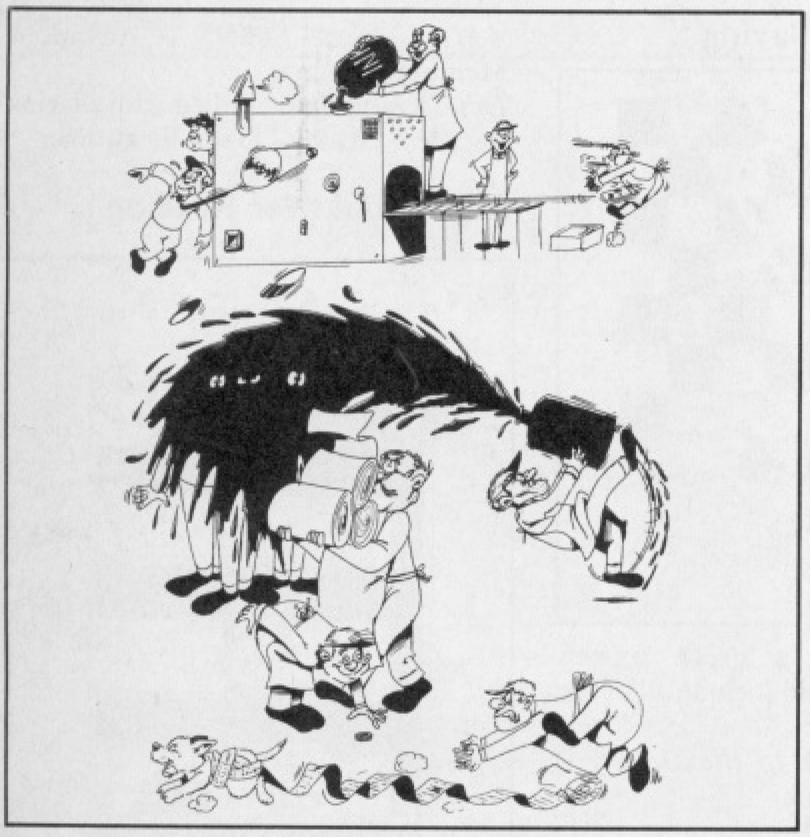
The biggest difference though between the 8 and 16 bit versions is in the speed of operation. The 64 version is very slow indeed, almost every command needing to access the disk drive and seeming to take forever and a day. Very frustrating indeed, when even my typing (ten words per minute – in a good minute that is) works faster than the game!

Corruption makes a pleasant change from troll bashing and if you fancy an insider view into the seedier side of high finance, then this is a game for you. My only suspicions will come if Magnetic Scrolls suddenly get floated on the Stock Market

GRH

Touchline:

Title: *Corruption.* ***Supplier:*** *Magnetic Scrolls Rainbird, First Floor, 74 New Oxford Street, London WC1A 1PS.* ***Tel:*** *01-240 8838.* ***Price:*** *£17.95.*



The 12 Days of Christmas

On the twelfth day of Christmas, My true love gave to me...

Twelve Printers Printing...

Although the range of printers available to Commodore owners may at first seem limited to Commodore's worthy but uninspiring collection, a Centronics or an RS-232 interface opens up the possibility of linking through to virtually any machine which may take your fancy.

Serious applications, such as for wordprocessors, are no longer limited to typewriter-style, daisywheel printers because the quality of NLQ printers has improved on most makes of dot matrix machines. Laser printers still remain at luxury prices, but offer the highest quality possible for applications such as the GEOS-based, GEOPublish DTP program.

The fastest, and strangest, machine is Precision's four-headed 4010 Peripheral Printer and the latest machine from Star Micronics, the LC-10C, allows limited colour printing with a respectable range of typefaces.

Brother Computer Peripherals, Jones & Brother, Shepley Street, Audenshaw, Manchester M34 5JD
Canon Business Machines, Haddon House, Stafford Road, Croydon, Surrey
Commodore Business Machines UK, Commodore House, The Switchback, Gardner Road, Maidenhead, Berkshire SL6 7XA
Citizen Europe Ltd, Hellington House, 4-10 Cowley Road, Uxbridge, Middlesex UB8 2XN
Epson (UK) Ltd, Dorland House, 388 High Road, Wembley HA9 6UH
Juki, c/o Intec 2, Unit 3, Hassocks Wood, Wade Road, Basingstoke RG24 ONE
Micro Peripherals, Intect 2, Wade Road, Basingstoke, Hampshire, RG24 ONE
Precision Software Ltd, 6 Park Terrace, Worcester Park, Surrey KT4 7JZ
Qume, Qume House, Park Way, Newbury, Berkshire RG13 1EE
Smith Corona (UK) Ltd, SCM House, North Circular Road, Stonebridge Park, London NW10
Star Micronics, Craven House, 40 Uxbridge Road, Ealing, London W5 2BS
Triumph Adler (UK) Ltd, OEM Special Products Division, 27 Goswell Road, London EC1

Eleven Music Makers...



Whether you use the in-built SID chip or a full-blown MIDI interface, the music capabilities of the C64/128 are broad enough for the most discerning ears. The enthusiast can experiment with keyboards, sound digitisers, drum machines or music-composing software and hardware. Always bear in mind that you only get what you pay for, and the quality that you require may cost a little more than you think.

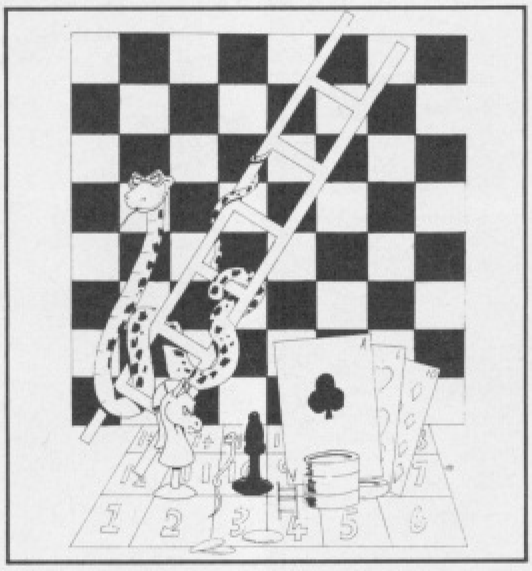
The best bargain is still the Commodore Sound Expander, which offers affordable FM synthesis on a quality keyboard, with up to 24 preset voices which can be expanded upon by using the add-on FM Composer/ Editor package.

Since its arrival, Sonus has made

quite an impact on the C64/128 MIDI scene (was there life in MIDI before Sonus?). With interfaces and software, what more could you want?

Commodore Sound Expander £99.99: Music Sales Ltd, 8-9 Frith Street, London, W1V 5TZ.
Music Maker II 64/Music Maker 128 £19.99/24.99: Music Sales Ltd, 8-9 Frith Street, London W1V 5TZ.
Sonus MIDI Interface
The Advanced Music System £39.95: Rainbird Software, First Floor, New Oxford Street, London
Microvox Sampler £229.95: Supersoft, Winchester House, Canning Road, Wealdstone, Middlesex HA3 7SJ.
Datel Sampler £49.99: Datel Electronics, Units 8/9, Dewsbury Road, Fenton Industrial Estate, Fenton, Stoke-on-Trent
Super Sequencer by Sonus
Rhythm King £39.95: Supersoft.
Com-Drum £29.99: Datel Electronics.
MIDI Interface C64 £79.90: ElectroMusic Research, 14 Mount Close, Wickford, Essex SS11 8HG.
MIDI Interface £29.99: Datel Electronics

Ten Games for Playing...



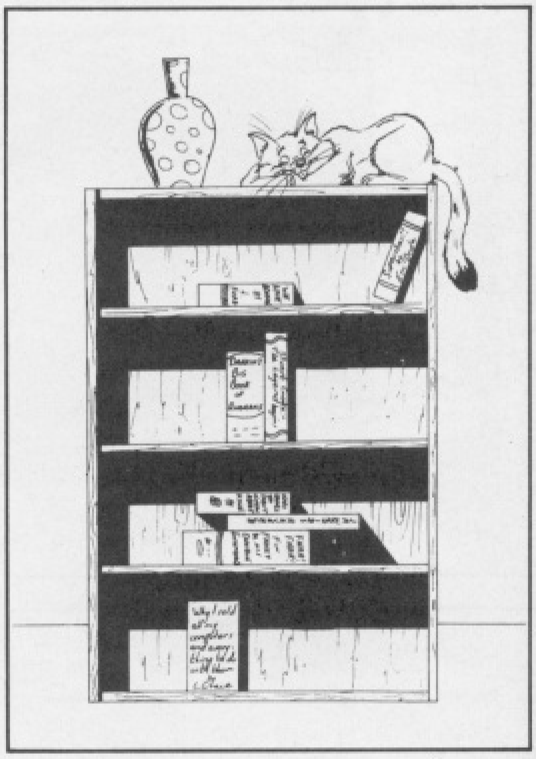
Any base for a great games collection should include all of the following:
Hitch-hiker's Guide to the Galaxy – Infocom/Mediagenic
Uridium – Hewson
Strike Fleet – Electronic Arts
Impossible Mission – US Gold
Ultima IV – Origin/Microprose
Mercenary – Novagen
Sentinel – Firebird
Gauntlet – US Gold
Last Ninja – System 3/Mediagenic
Stealth Fighter – Microprose

Nine Picture Painters...



Graphics on Commodore computers can only be fully exploited through a good arts package with first class aids.
Blazing Paddles £12.99 – Datel Electronics
The Advanced OCP Art Studio £24.95 – Rainbird
The Image System £14.95 – CRL
Artist 64 £29.95 – Wigmore
Cadmaster (plus free lightpen) £19.95- Trojan
Neos Mouse £24.95 – Stack Computer Products
Datel Mouse £24.99 – Datel Electronics
AMX Mouse £69.95 – Advanced Memory Systems
Datel Lightpen (supplied with Blazing Paddles) £24.99 – Datel Electronics

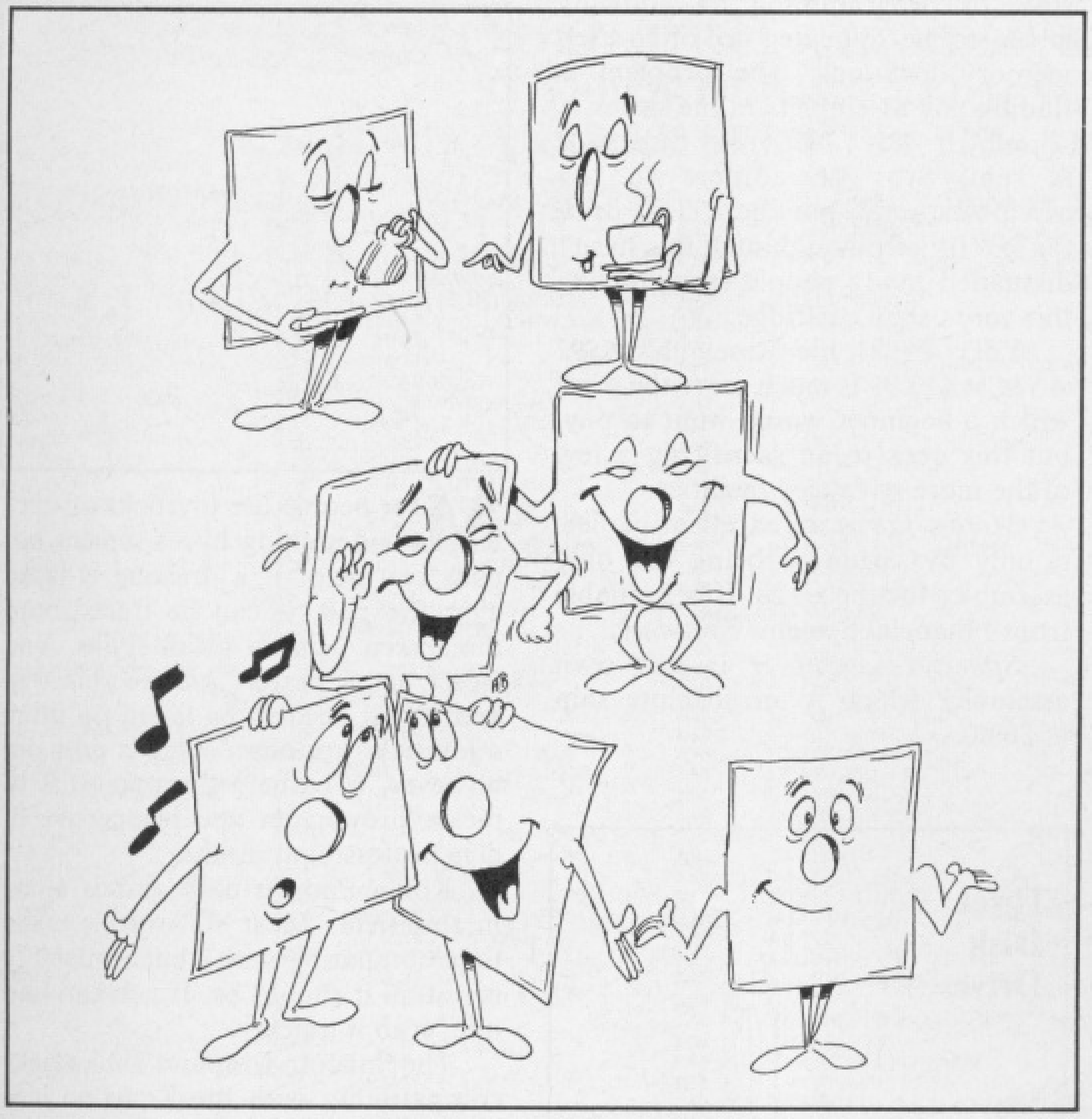
Eight Books for Reading...



Although many books have been written for the C64 and C128, many are now difficult to find or are simply out of print. To help you we have included all of the information we could find, in the format: title – author – publisher – ISBN – price.

The Commodore 64 Programmer's Reference Guide – Commodore Business Machines/Sams & Co Inc – ISBN 0-672-22056-3
Advanced Commodore 64 Graphics and Sound – Nick Hampshire – Collins – ISBN 0-00-383089-6 – £8.95
Commodore 64 Music – Ian Waugh – Sunshine Books – ISBN 0-946408-78-5 – £6.95
Compute!'s VIC-20 and Commodore 64 Tool Kit: Kernal – Dan Heeb – Compute! Publications Inc. – ISBN 0-942386-33-7 – £13.95
Mastering Machine Code on your Commodore 64 – Mark Greenshields – Interface Publications – ISBN 0-907563-69-4 – £7.95
The Armchair Universe – A.K.Dewdney – W.H.Freeman & Co – ISBN 0-7167-1939-8 – £10.95
Basic 128 Training Guide – Frank Kampow – Abacus Software – ISBN 0-916439-64-X
The Anatomy of the Commodore 64 – Angerhausen, Becker, Englisch, Gerits – Abacus Software – ISBN 0-916439-00-3

Seven Disk Companions...



Apart from Trilogic's Datasette Doctor and Mills Associates' Load-It kit, there are very few aids for cassette users so it's the disk users that benefit from this section.

Drive Doctor from Trilogic has established itself as one of the easiest to use disk alignment kits which has the advantage of having the test programs on tape and only costs £14.99.

1571 *Fix ROM* cures the failings of the C128D disk drive – £24.95 from Financial Systems Software Ltd.
Dolphin DOS is tricky to install and requires a certain amount of desoldering of the C64 circuit board but is well worth the effort. Evesham Micros sell the kits for £69.95.

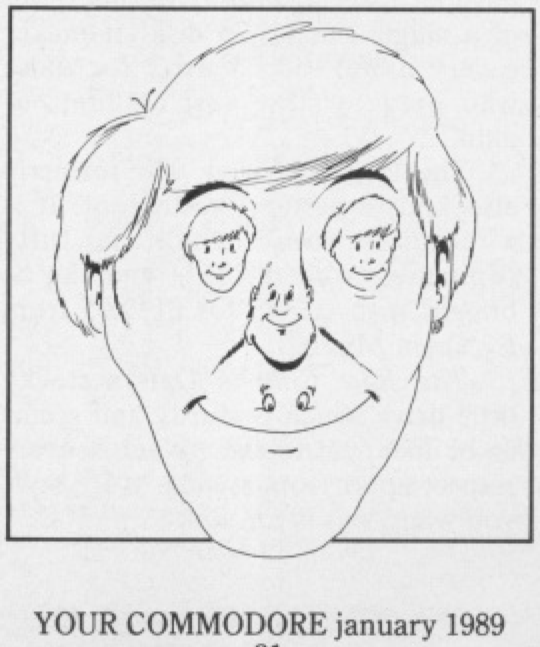
The Notcher (£4.99) from Suncom is a cheap way to double your disk capacity. This handy tool punches a notch which renders the reverse side of the disk usable. Microprose are the Uk distributers of Suncom products.

No disk drive owner should be without our sister magazine, *Commodore Disk User,* which offers a disk of useful utilities, games and tutorial programs with programming features and games reviews in the magazine itself. *CDU* is issued bimonthly at the bargain price of £2.50.

Disks need to be protected from dust and stored tidily. There are many disk boxes on the market for around a tenner but the super deluxe version is Inmac's £39.95 lockable box, which has a built-in burglar alarm!

Serious disk users will find the book *The Anatomy of the 1541 Disk Drive,* by Abacus Software, an invaluable aid.

Six Interfaces...



Interfaces fall into two broad categories: Centronics and RS232. Centronics interfaces are generally preferred because the driver program and hardware is contained in a separate box and therefore doesn't take up any of the computer's memory. An extra benefit is that these units plug into the serial port, the normal printer port on the C64/128.

Brain Boxes of Liverpool produce one of the cheapest printer connectors available. The kit comprises a memory-resident Centronics driver for £5.99 and a connecting lead (£19.95) which plugs into the user port. Brain Boxes own RS232 connector and software costs £49.95.

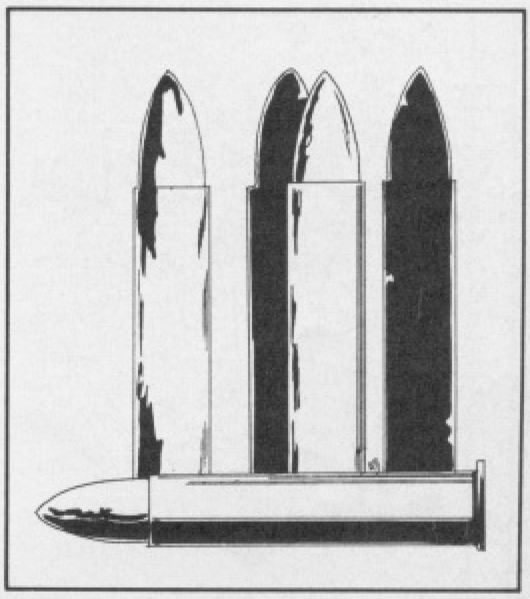
Precision Software's *Super Centronics* interface is a low-cost device with a few advanced features for £34.95.

Device One is more expensive but it does contain a 16K buffer and 30 special commands for formatting printouts and accessing special printer facilities.

At £29.99, the *York Electronics Research RS232* interface is not as sophisticated as that of *Brain Boxes* but it still performs well and comes with its own driver software.

The Xetec Super Graphix Gold is the ultimate interface. It has 32K of RAM, eight switchable operating modes, 20 secondary addresses, 32 printer settings, four internal screen dumps, four built-in fonts, and so on. In fact, everything you could need but a confusing unit for the newcomer to printing.

Five Car-trid-ges...



Cartridges are usually considered to be the commoner's piracy kit but

they can do more than just blag. They all contain disk turbos and the speed is expressed as a multiple of the normal loading time which is taken as 1x or one times normal.

The facilities of *Quickdisk* (Evesham Micros) are reflected by its low price of £19.95. What it does, it does well, but it is basically a fast disk (5x) utility cartridge.

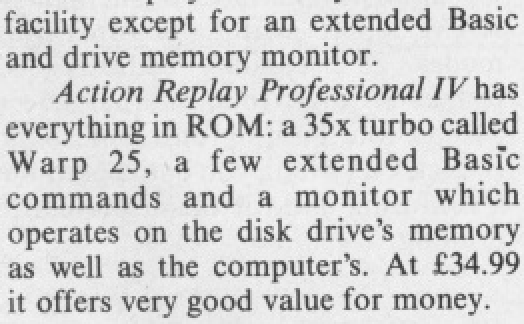
Freeze Machine, also from Evesham, costs more (£28.95) but it actually conceals two discrete fast disk operating systems (one 9x and the other 15x faster but using non-standard disk storage) and a tape turbo which increases tape loading to professional standards.

The Final Cartridge III is a quirky unit (£39.99 from Datel) which is cosmetically appealling but not fully thought through. It does, however, have an excellent program compactor and extended Basic and reaches disk speeds approaching 15x.

Trilogic's Expert cartridge (£29.99) has the benefit of being RAM based so that updates can be acquired cheaply. This does have the disadvantage that it has to be re-booted each time the computer is switched on, but it does have a turbo which reaches speeds equivalent to Action Replay and every conceivable facility except for an extended Basic and drive memory monitor.

Action Replay Professional IV has everything in ROM: a 35x turbo called Warp 25, a few extended Basic commands and a monitor which operates on the disk drive's memory as well as the computer's. At £34.99 it offers very good value for money.

Four Assemb(e)lers...



An assembler is an essential aid for machine code programmers. It even simplifies the mnemonic monitor style of programming by allowing labels to be allocated to often-used memory locations. The problem is finding any assemblers in the shops.

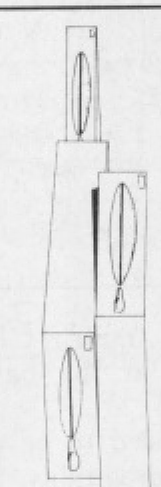
Mikro Assembler from Supersoft is really for newcomers to the assembler arena but the £57.70 price tag is a little heavy, though this hasn't dissuaded many people from buying this very useful cartridge.

York Electronic Research's *6502 ASM* at £12.99 is much more the price which a beginner would want to pay, but this does mean sacrificing a few of the more advanced facilities.

Merlin 128 is an excellent choice, if only by virtue of being the only assembler for the C128. It is available from Financial Systems Software.

Speedy Assembler is our own assembler which is an absolute snip at £6.00.

Three Disk Drives...



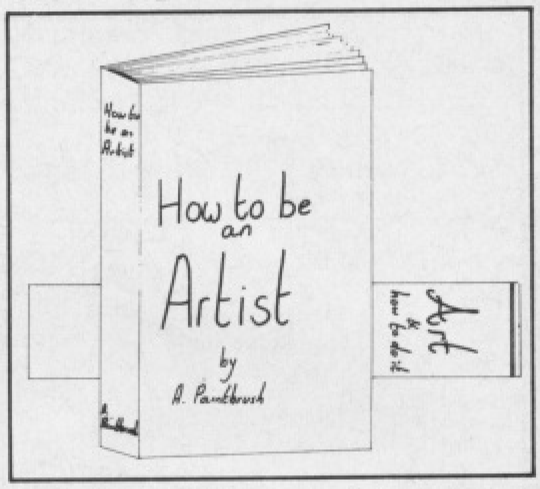
If you want compatibility stick to the 1541 or 1570 is the general advice that many computer salesmen would give, but there are other reliable options.

The Commodore 1581 is a late-comer to the fold and a very odd beast it is, too. It uses 3.5 inch disks which have a capacity almost five times that of a single sided 5.25 disk. It makes a very useful second drive for those who need to store vast amounts of data.

The *Oceanic Drive* was formerly also known as the Excellerator. It is a compact unit which is fully compatible with the 1541 and can be bought with GEOS for £129.95 from Evesham Micros.

The Blue Chip is Datel's stocky little drive which is sturdy and seems to be identical to the 1541C in every respect apart from styling. If it's style you want, this is for you.

Two Graphics Pads...

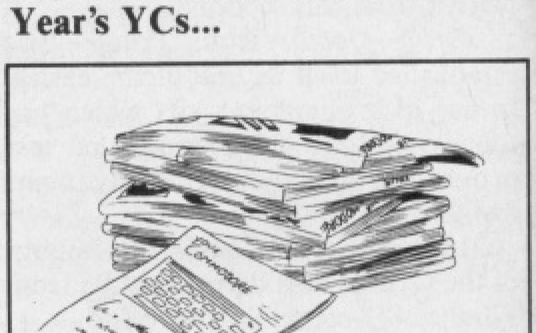


Most people use joysticks or mice for designing hi-res screens but pads can help. If a drawing is layed over the pad, it can be traced onto the screen using a small stylus. You won't get a perfect picture this way and it will need to be tidied up using a joystick or mouse. What it does do, however, is to help the non-artist to tackle proportion and perspective to give professional results.

Koala Pad virtually stands alone in this field. Most software is made to be compatible with it but availability is not all it should be. If you can find one, grab it quickly.

The Suncom Graphics Tablet lacks compatibility with the Koala so it is not so well supported. Its one advantage is that it can be easily obtained through Microprose.

And an Order for All This Year's YCs...



The best way to decide what you want next Christmas is to read the only magazine which specialises in reviews and programming techniques. As your skills grow, so do your needs and we are here to help you make your next choice a good one. A subscription only costs about the same as a good adventure but it will last you longer and take you through the changing landscape of the world of Commodore.

Anne O'Nimas

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Basic 8

Basic 8 is a Basic Extension with knobs on, from the exotically named Walrusoft. The name is clear once you know that this is largely a couple of guys named Louis R. Wallace and David P. Darus (Say what? – I thought that was Groucho's name in *The Big Store).*

No less than 53 commands are added to the C128's repertoire by the package, some of which are more advanced versions of the C128's existing commands. The authors have conceived it as a graphics-orientated language, and certainly commands in the area are lavish.

This is the first language I've seen for the 64/128 that defines graphics pixels as existing in 3-D space. Although the majority of shapes definable are themselves 2-D, this means that they can be rotated into and out of the screen. Both perspective and parallel viewing of the objects is possible.

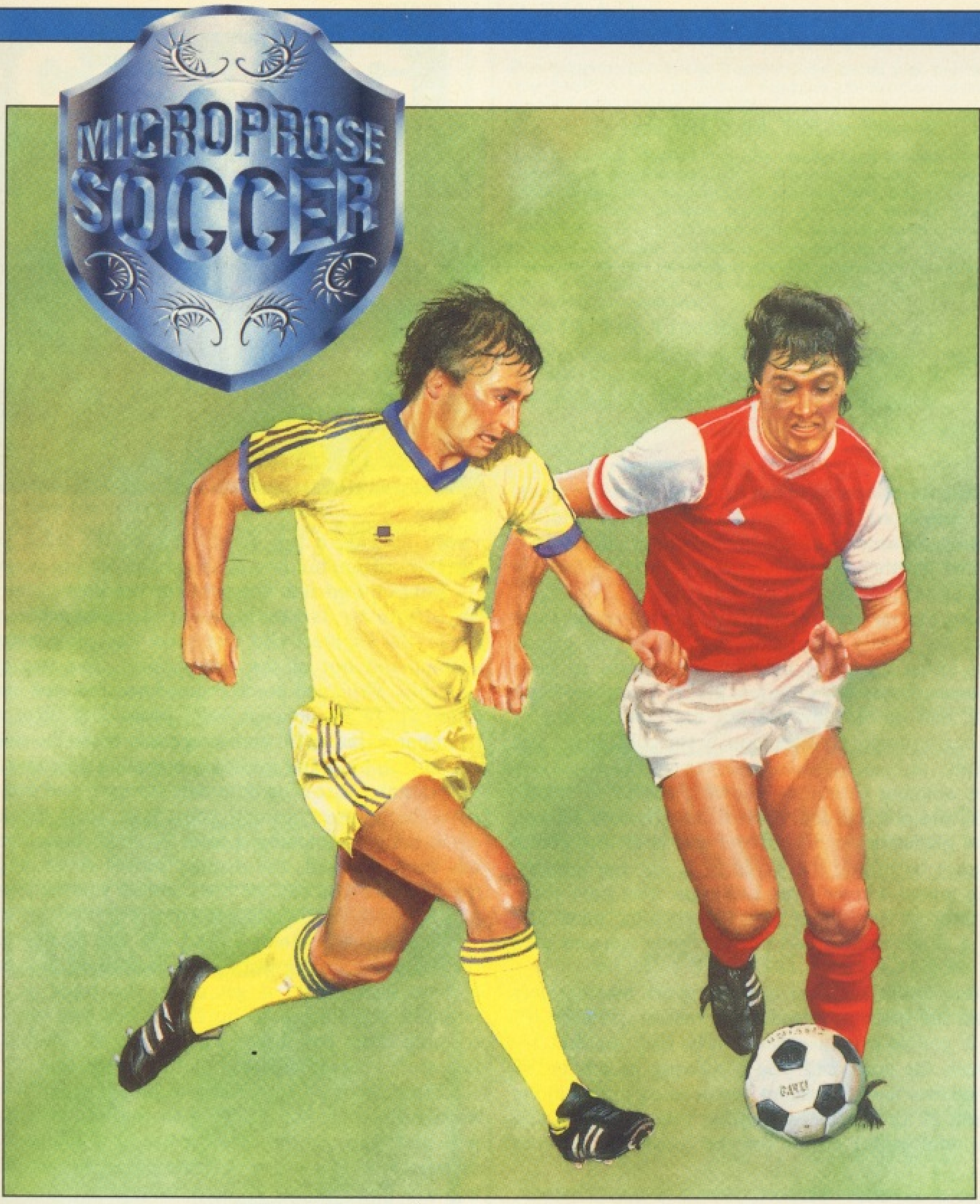
Besides this, Basic 8 does have a number of solid '3-D' commands. These are based on algorithms developed by Richard Rylander for the C64, and they work very effectively.

The commands are very pretty for all that. You can draw spheres, cylinders, spools and toroids in half-tone of random shading, of any aspect, so this at least makes Basic 8 unique.

These are really just special effects, though. There is more meat here than that. The package also allows you to define multiple windows to put text and graphics in. Text can be in any font you choose, as long as you've got it on disk, and you can set parameters to alter the height, style and so on of the characters. A special form of the character command, the logo structure, allows you to set up complex text data structures such as one command, and implement these as one command.

The package contains a host of other features, such as full mouse support. You can sample these for yourself quickly, since the package also contains Basic Paint, a very effective drawing package based on icons, Which is effictive, if a little slow. But what can you expect – it's written in Basic.

The best thing of all is that unlike many other packages, the developers don't mind other people using the Basic 8 package to set up their own run-time packages. This makes it definitely a worthwhile package for any one thinking of developing their own graphics software.



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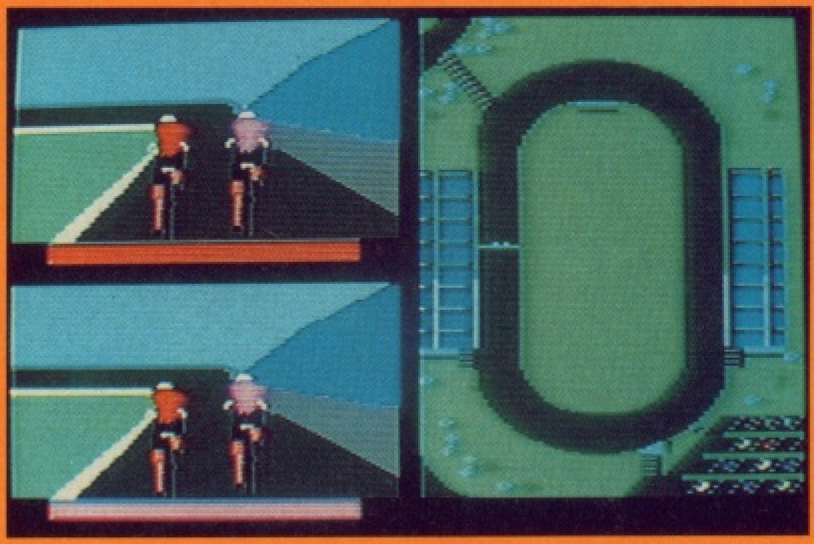
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The Games:



Following the release of *Winter Edition* in the summer, Epyx plans to complete it's unique double by releasing *Summer Edition* in the winter! But this is more than just another in the "Games" series – it has 3D action and a brand new style of presentation.

It was also the official game of the US Olympic team in Seoul, so it's hardly surprising that all of the events included are either currently held by Americans, or have been the source of past US Olympic glory. There are eight events in all, and up to eight players, representing any of 24 nations, can compete simultaneously for gold, silver and bronze medals.

After an opening ceremony showing scenes of Seoul, the screen shows a top down view of the Olympic village, and then the games begin. The first event is diving, giving you the chance to mimic the exploits, if not the injuries, of American medal winner Greg Lukargis. You have three chances to impress the judges with somersaults, pikes and twists, and a single splash can destroy your chances of a medal.

Velodrome cycling is that curious sport where riders crawl around the track at a snailspace before sprinting for the finish. If you've ever wondered why they do this, try sprinting from the start and you'll collapse in a heap by the end of the first lap. The secret lies in being pulled along by the suction of air caused by another bike, allowing you to conserve your pedal power for the finish. In the split screen display, a top down view of the track plots each rider's position, but two 3D close-ups let you see the action.



Next you go into the gym for the uneven bars and the rings. Both are demanding and exhausting technical events, where the slightest slip can send you plummeting to the ground and out of the competition. The two events are superbly displayed in 3D graphics, but are remarkably different. In the uneven bars, twists and turns swap you from bar to bar at an alarming pace, while the rings require strength to hold and maintain crippling positions.

Hammer throwing demands strength and timing as you swirl the hammer around your head, then spin across the circle before launching it into the field. Once the hammer has been released, the display moves to an angle out in the field and you can see the hammer soaring towards you, perhaps for a new world record.

Next it's Ed Moses time, with the hurdles waiting to trip the unwary. Here it's the fastest time that matters, so all you have to do is get down the track as quickly as possible, negotiating the hurdles as best you can. Obviously tripping slows you down, but as long as you don't actually fall you'll stay on your feet and in the medals.

The pole vault is a tricky technical event in which you must bring together a spring to the bar, the lift with the pole and then turning over the bar. If it all comes together, fireworks go off and your joystick athlete celebrates with a Daley Thompson-style back somersault.

Finally, Archery demands different skills – judging the amount you pull back on the bow, aiming at the target and waiting for the wind to drop before you fire. Unfortunately, a 90 second clock piles on the pressure, but there's enough time to fire three arrows if you keep cool.

The Games: Summer Edition ends with a closing ceremony complete with winning podium and demands from your players for just one more game. Undeniably, it's the 3D graphics that literally add a new dimension to a tried and tested winning formula.

T H

Touchline:
Title: *The Games: Summer Edition.* ***Supplier:*** *Epyx (US Gold), Units 2/3 Holford, Holford Way, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.* ***Machine:*** *C64/128.* ***Price:*** *£14.99.*

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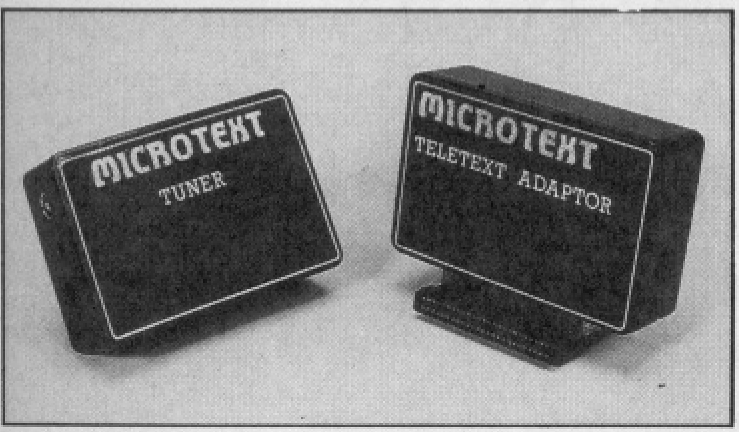
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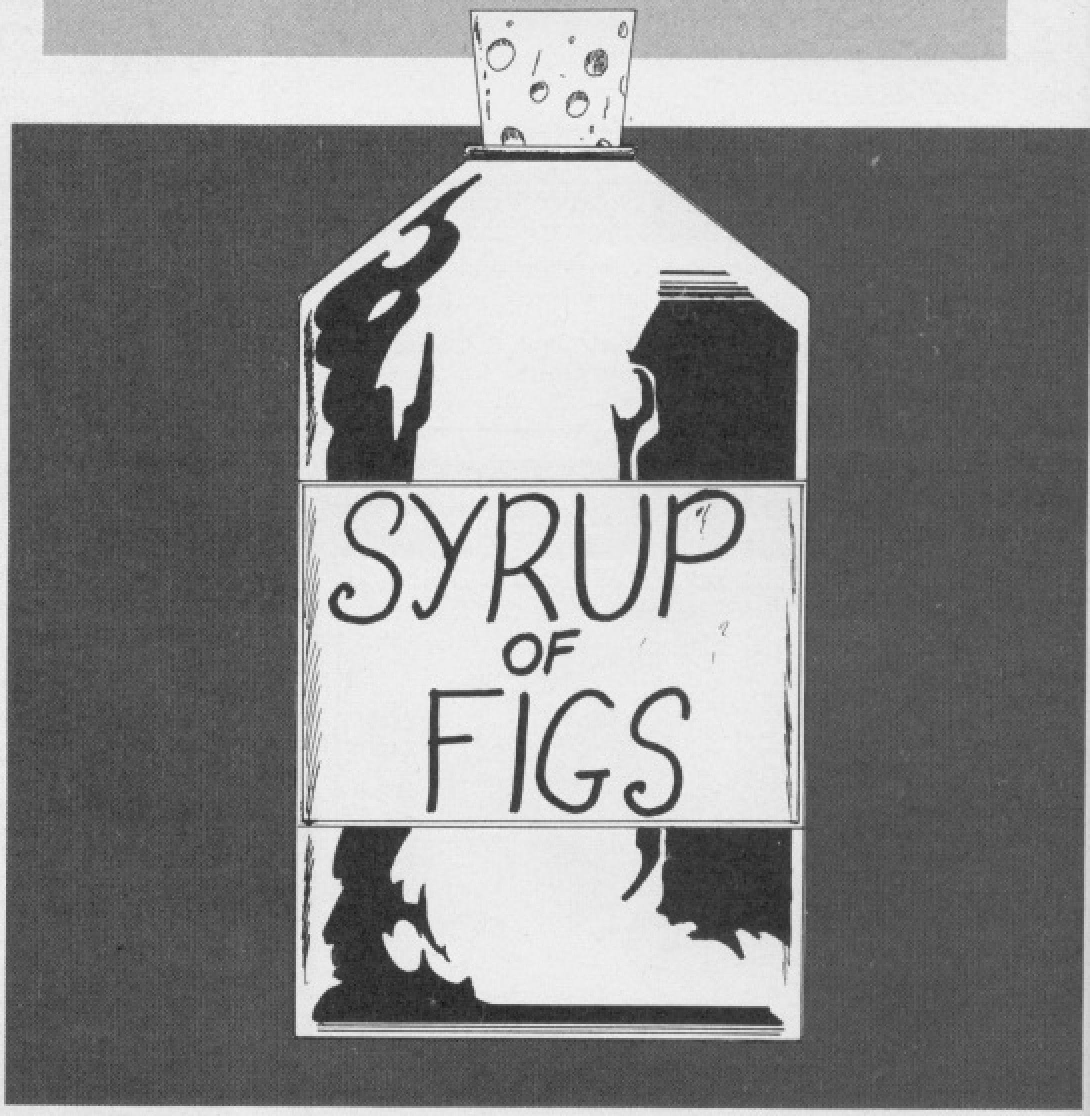
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Using tapes can be hard work. Make your life easier with this utility which sets up a loading menu at the start of your tapes

By Terry Wilks

Plus/4 Tape Auto-run



The tape drive systems of home microcomputers such as the Commodore 16 and Plus 4 are more simple and far less versatile than the large complex drives of mainframe computers. They do, however, retain the benefit of being an inexpensive program storage medium. Microcomputers, of course, have progressed considerably in the past ten years, but one of the annoying features of their use is the lack of ability to load a program from tape that will automatically start at the completion of the loading operation.

Basic programs are no major problem. They only require the entry of RUN plus RETURN from the keyboard. Machine language programs are another matter. Most of the time these programs will require their own peculiar start address to be entered. Good housekeeping techniques do reduce the chances of losing this address, but then how many of us keep a perfect house? There will be many occasions that will require a time-consuming search through old magazines to find that start address.

The program presented in this article overcomes this limitation in the tape operating system and allows both Basic and machine language programs to self start. This removes the requirements imposed on start addresses. The Basic portion of the autorun program is fairly long, however fairly extensive checks of the utilisation of the computer's RAM space are carried out to ensure that no program hangups occur.

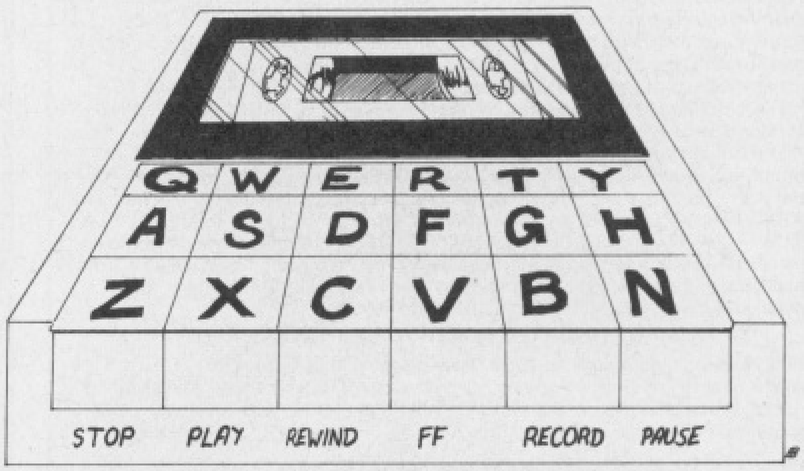
The program also allows address data required for the autorun program to be entered in either decimal or hexadecimal format. During entry of this data, it will be necessary to specify data type. One of the problems that can occur with this type of entry system is neglecting to specify data type – should this occur the user will be flagged with a double question mark at the beginning of the line following the input line. Do not try to enter data type on this line, simply press Return. A prompt will then appear requesting data type, and once this prompt is answered the program will continue uninterrupted.

Be sure to Save the program before running as it will destroy the Basic portion of itself as soon as the required information is entered. I have not incorporated a verifying facility, so be sure that your own program is saved by the normal method first. To load an autorun saved program, simply type LOAD or LOAD"FILENAME". All of the necessary Zero Page pointers will be taken care of by the autorun portion of the saved program.

Getting it on

The program is mostly a Basic listing with a machine code loader section. For help keying it in, see our Listings page.

If you've considered writing for us, but haven't got a wordprocessor, here's a little something that may help



By Darren Bawden

Dazpro

Although Dazpro is a very simple text processor, it should meet many of your needs. Simple it may be, but it will still allow you to do such useful things as centring and justifying and adding headers and footers. Just the thing to get you started on that career as a novelist.

Operating Instructions

Dazpro is always entered, once you have typed in the Basic loader, by entering SYS 35050. It's then just a matter of typing in text using the usual Basic editing functions. Dazpro colours are changed as follows:

Change border colour: CTRL/1
Change screen colour: CTRL/2
Change text colour: CTRL/3

All other features are implemented by entering Command Mode, which you do by pressing the F1 key:

Set left margin: F1+L – You must then enter left margin value, which must be less than the right. Value should be two digits with leading zero if necessary, for example '02'. The figure must also be between 0 and 79 inclusive.

Set right margin: F1+R – Constraints are the same as when setting left margin. Obviously the setting must be greater than that for the left margin.

Insert line: F1+INST at cursor position.

Delete line: F1+DEL at cursor position.

Justification on/off:F1+J - This is a toggle for left justification of text. A 'J' will appear on the top left of the screen to show that this is on.

Right alignment on/off: F1+A – Toggle for right alignment of text. An 'A' at top right will show that this is on.

Centreing on/off: F1+C – A 'C' at top right will show when this is on.

Key-beep on/off: F1+K – 'K' at top right shows when this is on.

Save file (tape only): F1+S – You will be asked to enter a filename up to ten characters in length.

Load file (tape only): F1+L – You will be asked to enter a filename up to ten characters in length.

Print file: F1+P – A Commodore printer, or an interface which emulates one will be needed for this.

Go back: F1+ – Moves the cursor to the end of the previous line.

Clear memory: F1+RUN/STOP – clears all text, reverts margins to default values and resets all text formatting.

Note that after any I/O operation, such as saving, loading and printing, all margin values will be reset to default and the cursor will be homed. Default values for margins are 05 left and 75 right. All text formatting features will be disabled.

Dazpro is supplied in the form of a Basic listing – please refer to our Listings pages for further help.
for further help.

Final Assault

From this game's title, I must confess that I was expecting some sort of SAS-style shoot out. That it would prove to be a mountaineering simulation came as a great surprise. Climbing large chunks of rock sticking out of the ground was not a sport that I had ever considered as being suitable for conversion to a computer game. Nevertheless, that is what Infogrames in conjunction with Epyx have managed to come up with.

Most of the top peaks in Europe are available for you to test your skill on – Mont Blanc, Jungfrau, the Eiger and the Matterhorn. Names to make any budding Chris Bonnington quake in his crampons.

The easy part comes when you sit back in your comfy armchair, deciding which of the routes you are going to attempt. There are six grades: easy, intermediate and who's a little show-off then. For real masochists, up to three trails can be attempted one after the other. As you select each route, you are shown its name, elevation in metres and estimated time for completion of the climb – assuming that you don't fall off too often.

Next comes the important part – deciding what you are going to take with you. Your rucksack can hold up to 25kg of gear. Actually, it can take more but every extra item that you pack increases the likelihood of you moving in the opposite direction to that which you would like to go.

The items to choose from are many and varied. Some, such as ropes and hammers, are obviously essential. There are a whole range of these tools including chocks, jummers and carabiners. Fortunately, the instructions include a handy glossary so you know what it is you are lugging about with you.

Then you have to keep warm, so there is a range of clothing and sleeping equipment to include – anoraks, mittens, tents, snow goggles and the like. Food and drink must also be carefully planned. Some foods are obviously better than others for giving maximum energy for minimum space taken up. You will also need a cooker, plates and some sort of tin opener.

The last group of items are the luxuries which you can pick if have any space left over. A bottle of champagne might be a good way of celebrating but who in their right mind is going to want aftershave? Knowing how it stings at sea-level, can you imagine what it is going to do to your face at 12,000 metres? Still, the game was written in France and we all know what a strange lot they are. (All this is very choice, coming from someone whose face hasn't been near a razor for the past ten years – ed).

All that remains to do now is to decide what time of day you are leaving and whether it's summer or winter.

Once the journey has started, there are three main types of terrain for you to overcome. The easy one is hiking when the ground is flat. A quick waggle of the joystick gets you walking and you only have to remember to jump over the crevasses. A similar idea is used for climbing ice cliffs. After putting on your crampons, you need to build up a rhythm of digging in your axe, securing one foot, pulling yourself up and setting the second foot.

By far the most interesting part of the game is the rock climbing. Each limb has to be moved separately as you search out the best hand and toe holds. Grips can range from secure to tenuous to non-existent. Whilst three solid holds are advisable, allowing you to move the fourth limb safely, this is not always possible. This means you are faced with the job of not always moving to the correct spot and you have to work quickly as well to secure a safer hold on things.

The best line to take is not necessarily straight up. You will have to traverse, or even move down, to find better holds. You must also take the necessary evasive action if rocks start to fall on top of you. Should the going get too tough, you can always use your rope to help you out but remember to pack a jummer so that it can be recovered again.

I must confess to going into this review expecting to be bored silly. Instead, I found Final Assault to be both interesting and challenging. Presentation and control of the game are above average and it really does make it pleasant to play something original for a change!

Gordon Hamlett

Touchline:
Title: *Final Assault.* ***Supplier:*** *Epyx/US Gold, Units 2 & 3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.* ***Price:*** *£14.99 (Disk) £9.99 (Cassette)*





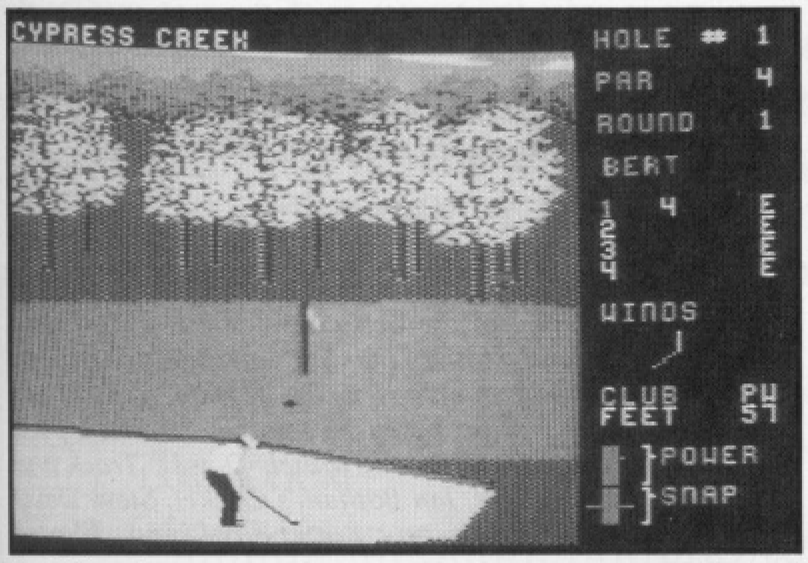
Collectors' Items

Why not fill your Christmas stocking with a few legends?

Compilations are the hi-tech equivalent of stocking fillers and by the look of things, this year's footwear should be bulging with software.

The big names seem to be bringing out real crackers to woo you away from the Christmas pudding. All this meat and not a turkey in sight! Bootiful.

With US Gold, Ocean, Elite, Gremlin and Beau Jolly all vying for a slice of the action, how will anyone find time to buy the full-price new releases? Okay, so the compilation games aren't brand spanking new, but they do represent excellent value for money. What better way to fill in gaps in your collection of games or to get a new one off to a flying start?



Leaderboard

US Gold

US Gold are past masters of the art of compilation and have released four packages guaranteed to get your mouth watering.

The first and largest package is modestly entitled *History in the Making* and contains 15 of their best-selling titles which have been released over the past four years.

Beach Head and its sequel, unoriginally called *Beach Head II,* offered Second World War shoot-em-up action as you try to break down the enemy's defences, using a combination of guns and grenades. If driving fast vehicles is more to your taste, then how about *Spyhunter* which combines driving skills with the ability to shoot straight, or *Supercycle,* the motorbike simulation from Epyx.

Controversy raised its ugly head with *Raid over Moscow,* when certain elements of the media objected to the name. The game itself is a futuristic shoot-em-up, even if you are left in no doubt as to who are the baddies.

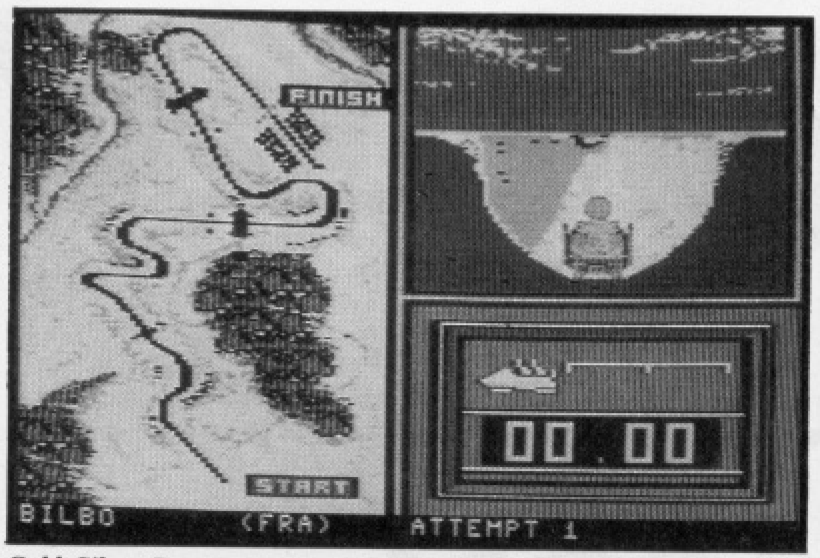
If close range combat is more to your taste, then *Kung Fu Master* gives you the chance to kick and punch your way past hordes of guards, dragons and the like. *Bruce Lee* continues the martial arts theme but combines the beat-em-up elements with a platform game scenario.

Further platform games in the package are *Goonies,* based on Steven Spielberg's film and *Impossible Mission,* one of the best games of all time, if only for the incredible speech effects – 'Destroy him my robots'.

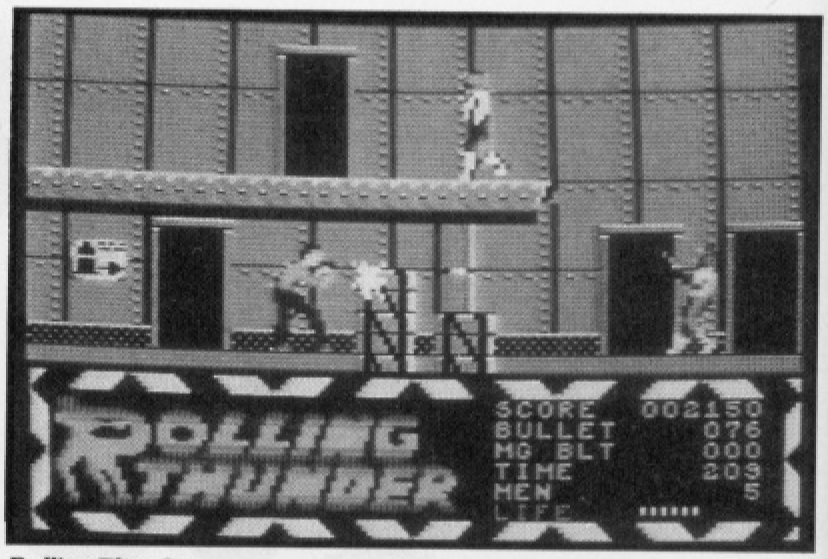
If strategy is more to your liking, have a go at *Infiltrator*. First you have to fly a helicopter deep behind enemy lines before launching a one-man raid on the enemy's home base.

For the sports-minded amongst you, *Leaderboard* is still the best golf simulation around (see below for more details). *World Games* gives you the chance to try your hand at tossing the caber, weightlifting, cliff-diving and other diverse pursuits.

The last batch of games are all conversions from arcade classics. Is there anyone, anywhere who has not heard of *Gauntlet?* There is? Well in that case, the game involves exploring and fighting your way through as many dungeon levels as possible using one of four different characters.



Gold, Silver, Bronze



Rolling Thunder

Likewise, is there anyone who has ever watched the cartoons who has not wished that Wile E. Coyote would catch that awful *Roadrunner* just once?

Finally, there is *Express Raider,* a Western involving plenty of shooting and leaping from train to train and all the other typical things cowboys do.

History in the Making costs £24.99.

At the time of writing, the Olympics are in full swing and as usual, there is the tendency to play the armchair expert. If your athletic prowess extends no further than the armchair (all my exercise stopped when I got a watch that didn't need winding) then perhaps *Gold, Silver, Bronze* is the package for you. Comprising the first three multi-sport titles from Epyx – *Summer Games I* and *II* plus *Winter Games* – you get the chance to make an utter fool of yourself in the privacy of your own home in no less than 23 different events.

The Games range from traditional track and field events such as pole vaulting, 100 metres, high jump and javelin, through the more unusual sports of swimming, diving, shooting, cycling, gymnastics and show jumping, to such winter wonders as biathlon, bobsleigh, ski-jumping and figure skating. *Winter Games* has caused more hilarity in our household than any other game, before or since.

If you have not already seen these games, they really are superb, especially if you get a crowd of you playing at the same time. *Gold, Silver, Bronze* costs £14.99 (cass) or £17.99 (disk).

For anyone fancying themselves as the next Sandy Lyle or Nick Faldo, this next compilation is indispensible. Even if you are not exactly keen on golf, this collection of games based on Leaderboard is undoubtedly one of the best sports simulation programs written to date.

Entitled *Par 4,* the package consists of the original game plus the *Tournament, Executive* and *World Class* editions. As well as offering a wide range of courses, these sets offer enhanced graphics and tougher gameplay options should you find that your touch with the pitching wedge is getting too good.

For anyone who has not seen the game before, you must select your club for each shot and then judge how much power to use and whether or not to hook or slice your shot. These last two variables are decided by judging when to stop a sliding bar display.

All the normal features of golf are present – bunkers, water hazards, cross winds, trees and sloping greens. There are three different skill levels and up to four people can play simultaneously. At only £14.99 for the cassette versions, this has got to be a great bargain.

The final compilation is entitled *Giants* and features five of US Gold's more recent releases. *Gauntlet II* is the sequel to the game that spawned a thousand clones and is packed with over one hundred new levels and many new features. There are more traps to avoid, monsters to kill, secret rooms to be discovered and, of course, bags of treasure to be picked up.

Rolling Thunder is another arcade conversion. You are part of an undercover police organisation trying to infiltrate and expose a secret organisation plotting to overthrow the world. This is a race against time to free your allies who are being held hostage.

Should you feel too cool and laid back to waste energy on some of the sports simulations mentioned above, how about California Games? A gentle game of frisbee, surf riding and skateboarding are amongst the events on offer here.

Skateboarding is also the name of the game in *720°*. The name comes from the ultimate manoeuvre available to you – two complete revolutions in mid-air. Before you get to be that clever, you may need to hone your skills in one of the many skate parks where you can practice either freestyle or in competition.

The final game was one of the biggest hits in the arcades during the course of last year. In an open-top sports car with your best girl by your side, choose your course and try to complete the various stages of *Outrun* within the time limit in order to progress on to the next one. Quick changes of gear are essential if you are to avoid the obstacles both on and off the twisting, undulating road.

Giants will appear on the new Worldbeater label in time for Christmas, but the price has yet to be announced.

Ocean

Ocean produced one of the best compilations of last year with *Game, Set and Match* and so it comes as no surprise that *Game, Set and match II* is on its way. Details are still vague but it will probably be another 20 event pack and will include *Basket Master, Match Day II, Track and Field, Nick Faldo's Golf, Ian Botham's Cricket, Steve Davis Snooker, Super Hang-on, SuperBowl* and *Winter Olympiad.*

Another Ocean offering is still to get a name but the

impressive line up is known which features eight games including six number ones. So if you're looking for a big value pack and you only have one or perhaps two of the following, then chalk this up as a must for Christmas as it includes *Combat School, Gryzor, Platoon, Last Ninja, Predator, Karnov, Target Renegade* and *Barbarian.*

Elite

Elite is famous for it's Hitpak series of compilations and produced the first one containing only its own games in the Best of Elite Volume 1.

Regular readers of *Your Commodore* will know that whenever a software house puts Volume 1 after a title you know there's a Volume 2 following shortly. Just to keep you guessing Elite has called the compilation *Frank Bruno's Big Box,* which contains 10 games including *Frank Bruno's Boxing* (surprise, surprise), *Commando, Ghosts and Goblins, Scooby Doo, Air Wolf* and *Bombjack.*

Fists and Throttles is the imaginative name for a five game pack containing fighting action from *Thundercats, Dragon's Lair* and *Ikari Warriors,* and a duo of racing games *Enduro Racer* and *Buggy Boy.*

Gremlin Graphics

Gremlin Graphics is well known for it's big-value compilations and was one of the first to enter the arena with it's Star Games range and, more recently, *10 Great* Games chalked up another first by including so many hits in one box. Gremlin has three more compilations lined up for this Christmas.

Ten Mega Games Volume 1 is the first from the relaunched Star Games series and packs *Cybernoid, Deflektor, Tour De Force, Mask II, Blood Brothers, Hercules, Northstar, Triaxos, Blood Valley* and *Masters of the Universe* into a single box.

Fighter Ace is a six game pack and the sequel to the kung-fu compilation *Karate Ace.* Inside, high flyers will find *Advanced Tactical Fighter, Strike Force Harrier, Spitfire 40, ACE, Tomahawk* and *Air Traffic Control* fuelled and ready for take off.

Similarly, you could travel into the future with *Space Ace* and tackle *Venom Strikes Back, Zynaps, Exolon, Northstar, Cybernoid, Trantor* and *Xevious* in a seven game pack.

Beau Jolly

Finally, look out for the latest releases from Beau Jolly. It's a company that doesn't get its fair share of publicity or magazine coverage but works hard in the background to compile formidable compilations.

It's current release is aptly named *Supreme Challenge* as it packs *Elite, Sentinel, Tetris, ACE II* and *Starglider* in the same box for only £12.95 (cass) or £16.95 (disk).

UDG Compressor

by Damien Marsh

Make way for more user-defined characters by wiping out the dulplicates

Anyone who writes games or programs involving graphics will know the simple technique of placing user-defined characters in a grid to make a larger picture. One problem with this technique is that duplicate characters are often formed. This really becomes a problem when you have filled your 256 characters already and wish to add more. The Basic program related with this article will search your character set for duplicate characters and then, upon your direction, delete them in one of two ways.

Getting it all in

The program should be typed in using the Syntax Checker program and then saved to disk or cassette. Thereafter, whenever you have finished creating a character set or have filled up the 256 characters and wish to add more, load your character set, type NEW and then load the UDG Compressor program and run it.

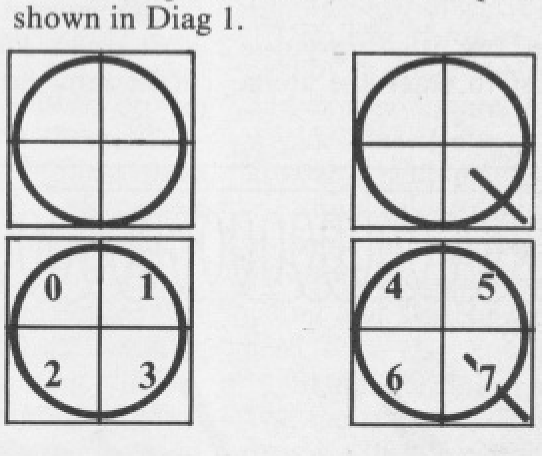
Even if you believe that your set has no duplicates, you should still run the compressor on it because it often picks up duplicates that the human eye misses. When tested on a copy of the Commodore ROM character set, it found ten duplicates.

Using the program

When running the program, it first asks you where the character set is situated in memory (remember the character set should be loaded before the Compressor). It cannot be stored in any area of shadow RAM below 6144 ($1800) or the program won't recognise it.

The program then asks for the last character in the set. Once you enter this, the search will begin for duplicated characters. This search may take quite a while, as every character in your set must be checked against almost all of the others.

Once the search is complete, the program will have formulated a table of duplicates. This table tells you which characters are duplicates of any of the others and could therefore be removed. If, for example, our character set contains eight characters (zero to seven) which form two grids to make up the letters O and Q as shown in Diag 1.



The chances are that characters four, five and six will be duplicates of zero, one and two, respectively. A table of duplicates would look like Table 1.

CHARACTER NUMBER	IS IDENTICAL TO
0	*****
1	*****
2	*****
3	*****
4	0
5	1
6	2
7	*****

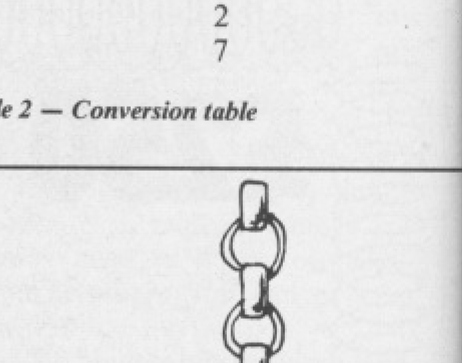
Table 1 — Duplicate table for Diag 1

A character with five stars in the right-hand column is an original whilst the others are duplicates of the character whose number is displayed. There are options to list this table to the screen or printer. When listing to the screen, a key must be pressed after each screenful of information.

You may now quit the program, delete the duplicate characters, and, if necessary, compress the set. If you choose to delete the duplicate characters, you will be asked for a value with which to fill them. After the operation is finished, a conversion table will have been created which gives all the information that you need to convert the characters in your old character set to their respective characters in the new set. A conversion table for our example characters would look like Table 2.

OLD CHARSET	NEW CHARSET
0	0
1	1
2	2
3	3
4	0
5	1
6	2
7	7

Table 2 — Conversion table



Make sure you always keep a copy of the characters used to make up your grids when using this program. First draw a grid for each character block as in Diag 2(a).

0	1
2	3

4	5
6	7

Diag 2(a) Original character grid 2(a)

Then draw another grid set ready to put the new characters in. Look down the column on the left for the old character number and read across to find it's new value in the right – hand column. Now write this new number in the correct place on the blank grid. Repeat this process until all your grids are filled. Our example character grids should now look like Diag 2(b).

0	1
2	3

0	1
2	7

Diag 2(b) Deleted character grid 2(b)

As you can see, characters four, five and six are now unused. If you were now to load the new set on your character editor, you would see that the deleted characters are now filled with the code you entered earlier in the Compressor program. You could now fill these characters with something else without causing damage to your grids.

Using this method gives you free characters scattered throughout your character set. Instead of choosing to delete the duplicate characters, you may choose to remove them and compress the set. This method compacts the original characters down over the unwanted duplicates, leaving all of the blank characters at the end of the set. If you have a large set, this process may take a few minutes.

Once again you have the option of listing a conversion table to the screen or printer. Use this table in the same way you would have if you had just deleted the characters without compressing the set. You may notice, in the table created by this process, that some of the original character's numbers change as well. Using this method on our example set would give us Table 3.

Table 3 — Conversion table after compression

OLD CHARSET	NEW CHARSET
0	0
1	1
2	2
3	3
4	1
5	2
6	3
7	4

The character grids for the new character set would look like Diag 2(c)

0	1
2	3

0	1
2	4

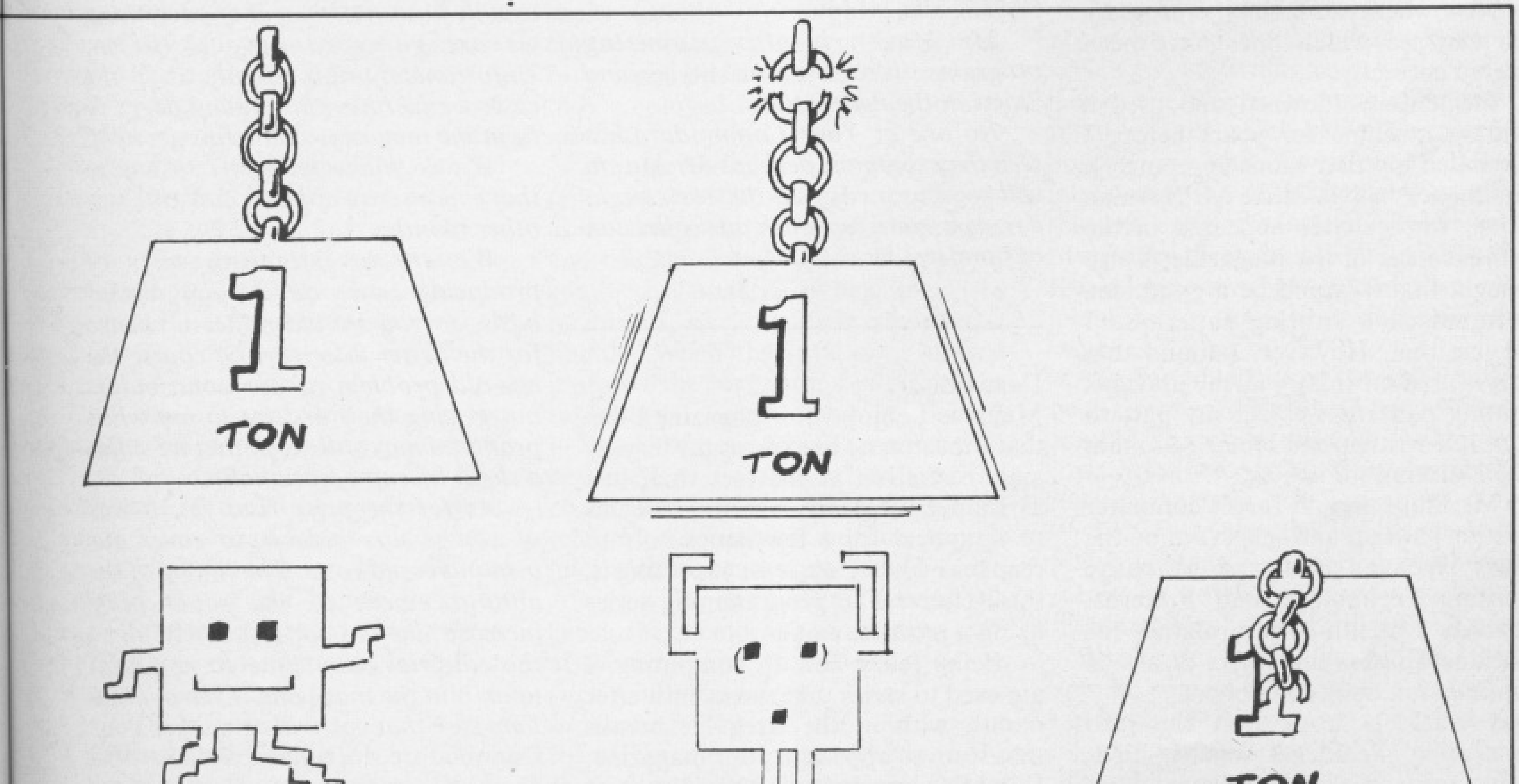
Diag 2(c) Compressed character grid 2(c)

Whichever method you use, it is very important that you have a hard copy of the conversion table. If you do not own a printer, you should list this table to the screen and copy it by hand. This may seem like a lot of work but it is worth it in the long run.

The serious games programmer or graphics artist will find this utility very useful indeed. To test the program, I created a character set comprising of the letters A to G, each in a three by three grid. The original set used over sixty characters but it compressed down to less than thirty.

Final note

There may be cases where you might deliberately wish to retain a set of duplicates such as the letter O with the number zero. In this case, you will have to change one of these before using UDG Compressor and remember to change it back afterwards.



Mailbag

We give you a chance to express your views on just about everything from the world of Commodore.

Dear Editor,
I was interested in the Lifesaver No 12 for the C64 in the November 1988 *Your Commodore*. The Illegal Quantity Error is not very helpful as your Lifesaver pointed out, but the article didn't go far enough.

As soon as the Illegal so-and-so message appears on the screen type, in direct mode, the following:

PRINT PEEK (63)+PEEK (64) *256

The C64 will now display the line number from which the last DATA item was read. List the offending line, correct it, and the RUN the program again.

When entering listings, I always find it beneficial to insert a line within the FOR, NEXT loop that reads the DATA such as:

PRINT "LINE NUMBER
";ln+(1*10);" is OK"

Where ln is the number of the first line of DATA, 1 is the FOR/NEXT variable and the DATA lines have ten items on them. Alter the values to suit the program that you are entering.

Now when you RUN the program you can see which lines have been entered correctly.

Incidentally I owned and used a knitting machine for years before I purchased my first home computer, a Vic 20 back in 1982. Like Mr Norman Stone, whose letter appeared in the October issue of the magazine, I also thought that it would be a good idea to formulate a knitting pattern so I did just that. However, I found that I never used the thing – all my previous knitting patterns were in my pattern book self-written, and I referred to that when knitting something.

Mr Stone should forget computer knitting patterns and splash out on the Mary Weaver book of Machine Knitting Technology and Patterns. There is a wealth of information for machine knitters and there is also a continuation book for ribbers.

I sincerely hope that the info concerning the Illegal Whatsit helps those readers who have not come across this before.

R T Goodwin, Nuneaton.

Thank you for your tip about the Illegal Quantity Error message. However, as with our lifesaver, you don't quite go far enough. C16, Plus/4 and C128 owners may like to know that the same formula will work for their own machines. For the C16 and Plus/4 the formula is the same. C128 owners should change the 63 to 65 and the 64 to a 66.

Mr Stone's letter about knitting and computing certainly seems to have sparked off some interest. Mr Stone and other computer knitters may be interested to know about a knitting program that one of Your Commodore's *readers is selling.*

The program, called Classic Styles, *allows you to design knitting patterns for round, V neck, Raglan Inset and Sleeveless jumpers using standard sizes or your own measurements. Once the pattern is designed it is displayed on the screen for you to copy, or, if you have access to a printer, you can produce a hard copy automatically.*

Classic Styles *is available from T.C.Mason, 15 Inishmoyne Green, Antrim, Northern Ireland, BT41 4JZ. Tel: 08494 65388. The program costs £7.95.*

Mr Mason is also promising programs titled Fashion Styles *and* Skirts *in the near future.*

No one at Your Commodore has seen the programs, perhaps Mr Mason will send us a copy so that we can do a review – and replenish our collection of jumpers!

Dear Editor,
Much as I enjoy your magazine I feel that I must write to express my dismay and frustration at the fact that, just as I am getting into a series, it seems to disappear for a few issues only to reappear when I am least expecting it, the Relative File programming series being a prime example.

Being fairly new to computing, I am used to series that run month after month without the irregular breaks that seem to appear in your magazine. I find this very irritating and I suggest that when gaps are unavoidable a word of explanation would not go amiss.

Having aquired a C128 earlier this year, I am struggling to get to grips with programming, and find the type of article that you publish important to me.

Another small niggle. I note that the price of the November issue has gone up by 10p. Unavoidable, you would no doubt say, and I do not really object to paying it. But most magazines would make some comment on price increase. I cannot find any mention of it in this issue.

K.Hellawell, Cirencester

Printing series on a regular basis has always been something of an editorial nightmare for Your Commodore. *The problem with our series is that many of them tend to require the inclusion of listings at the rear of the magazine. The Listings pages are one of the very last items to be designed together with the news, contents pages and the like. This unfortunately means that sometimes we simply do not have the room to fit in every single item that we would like to each issue. In an ideal world we would of course know exactly how long the listings section of the magazine was going to be and exactly how many pages of advertising we are going to have to fit in. Unfortunately this simply isn't the case, we just have too many pages to fit in the magazine and items get held.*

We do make an effort to ensure that every series appears at least every other month.

We are investigating ways of producing series on a more regular basis, so you should notice a change for the better this year. Of course the age-old problem of our contributors not getting their articles to use when promised may still mean that we suffer a slight hiccup occasionally.

As for the price rise, yes, it was of course unavoidable to cover our own increased costs. The timing of the announcement of the cover price increase did not unfortunately allow the editorial team time to comment upon it in the magazine. Even at £1.30 I am sure that you will agree that Your Commodore *still offers excellent value for all owners of Commodore computers who want to really use their computer to its limit.*

Comfort and Joy

A joystick is an essential peripheral, but how do you decide which one to buy?

By Eric Doyle

It's impossible to say how many kinds of joystick there are, and even if I venture to quote a figure here, it will be out of date by the time that this magazine appears. Despite such competition, it's still a lucrative market, and companies like Konix have made their reputations solely on the sale of these little plastic essentials.

It's a totally different story for the consumer. With most computer shops stocking just one or two styles, choosing the the perfect joystick for an individual's need is not easy, especially when the purchaser can rarely test the stick before buying. Other considerations which probably form the principal motivations to buy are price and appearance. This is rather like buying a house because it looks pretty from the outside and seems to be a bargain. As any house buyer knows, this approach can be fatal, and any house must first be examined and then surveyed by a professional. In the end it may not be the prettiest looking house that is purchased, but the most suitable when all of the considerations have been weighed against one another.

A similar approach should be adopted when purchasing a joystick. Don't just dash in and buy the first stick that is thrust into your eager hands. Look around and decide which one you might like to own, ask the assistant if you can handle it, study any information that may be written on the box and then ask yourself a few questions.

Comfort and Quality

Is it pleasant to hold? Try pressing the fire button while waggling the handle to see if the effort is liable to cause any strain on fingers or wrist. Bear in mind that both left-handed and right-handed people may want to use it, so would the position of the fire button cause any problems? Is the base too big? Are any extra facilities easy to use?

Does the stick look well-made? How does the handle feel? Check to see that it doesn't flop around. If it is a microswitched model, listen to the switches as you push the stick around. Do they make a definite double click when selecting the diagonal positions?

Remember that you get what you pay for and that the switches can be of three principal types. The cheapest sticks usually use bubble switches, contact switches are found in the mid-range and microswitches are usually only employed in the most expensive models.

Bubble switches are the simplest type and work on the same principals as the cheap, old, rubberised computer and calculator keyboards. A piece of conductive material is held over two terminals by a rubber or plastic bubble. When the joystick is moved it presses the conductor down onto the terminals, completing a circuit between them, and the computer then receives a current through the corresponding wire. When the stick is released, the rubbery medium springs back into shape and contact is broken. After a while, this constant flexing will cause the membrane to rupture and, at the very least, the efficiency of the stick will be impaired.

Contact switches come in various forms but the principal is always the same. Usually the contacts are springy metal strips which are held about an eighth of an inch apart. When the joystick is operating, one of the contacts is pushed against the other to complete the circuit, and when the pressure is relieved the natural springiness of the metal breaks the contact again. On the Suncom Slick Stik this principal is translated in a different way. The metal stem which acts as the core of the handle protrudes into a square well inside the stick's base. The rod forms one of the contacts and each side of the well has a small metal plate clipped onto it to form the other contacts. As the stick is waggled about, the rod touches one or two of the plates and the current flows accordingly.

Microswitches are the most expensive and most reliable system which a joystick can use. The movement of the joystick depresses small buttons which activate contacts housed in small plastic cases. This miniaturisation of the contacts means that the metal contacts can be flexed to enhance their natural spring and the whole system is less susceptible to metal fatigue than the normal contact switches.

So far only digital joysticks have been considered and these form 90 per cent of the types on sale. Analogue joysticks also exist, but these are much more complex in their operation.

Internally, the stick is connected to two ingeniously connected potentiometers. A potentiometer is a variable resistor which operates like a volume control. On audio equipment, the volume control acts like an electronic tap and, as the control is turned it allows more electricity to flow and the volume increases.

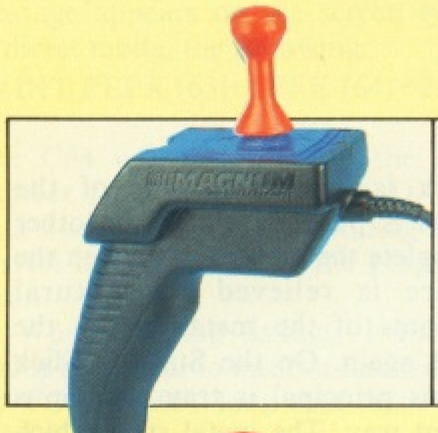
Similarly, in the analogue joystick the electricity is increased or decreased

the further the joystick is pushed in one direction or another. This means that the A/D (analogue to digital) converter in the computer can actually be programmed to detect how much current is flowing from each potentiometer and accurately position the cursor on a bit-mapped screen. Games are written with the digital stick in mind and this means that they only consider two states, on or off (current flow or no current flow). In my experience, the current detection on the joystick ports is sensitive enough to detect very low current flow so that an analogue stick can be the most sensitive and reliable of all joystick controllers.

The problem on all Commodore machines is that access to the A/D converter circuitry doesn't use the same connection lines as the digital circuits. This means that an analogue stick may be totally useless as a games controller, but some sticks that were produced for MSX computers are actually wired in a configuration that allows them to pass for a passable Commodore joystick. If you can find any, they are excellent devices but rare, and this survey will ignore analogue sticks because because buying one is a gamble if you can't try it out on a Commodore beforehand.

The Survey

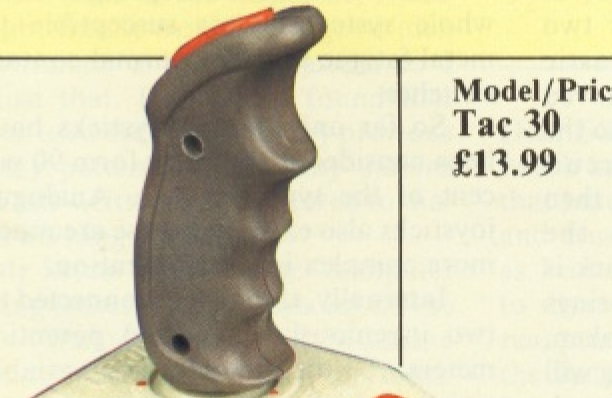
Most joysticks will work perfectly well in the horizontal and vertical planes (N, E, S, W) but the diagonals (NE, SE, SW, NW) may not be so easy to obtain. This is because the switches are arranged so that only one switch's contacts have to connect for the main axes, but two closed switches have to be achieved simultaneously for



Model/Price	Details	Comments
Magnum £14.95	Mastertronic Black base Red handle microswitches Single red button microswitch DS: Excellent	Pistol-grip styling. The firebutton is mounted on the rear of the platform and could be the source of some strain with protracted use. Nicely balanced but slightly awkward to hold. Not particularly suitable for shoot-em-ups.



Model/Price	Details	Comments
Competition Pro £16.49	Dynamics Transparent base Red handle microswitches Dual red buttons DS: very good	Exactly the same as the 5000 except that there is a special autofire switch and the firebuttons are microswitched. The autofire is electronically controlled to simulate extremely rapid presses of the button and should therefore work with most games. The switch has an extra setting which claims to be slow motion. Take this with a pinch of salt – the control only pulses the outputs from the direction switches so that the main character under joystick control moves in 'slow motion', not the whole game. I've yet to think of an application for this, but if you can then this is the stick for you!



Model/Price	Details	Comments
Tac 30 £13.99	Suncom/Microprose Cream base Grey handle microswitches Triple red buttons microswitches DS: good	Despite the firebutton-toting, ergonomically-designed handgrip, there's only one word to describe this stick: Tac-ky. The handle feels sloppy and the firebuttons on the base are connected by a bar which rests on a microswitch in a see-saw manner. The result is an unreliable system which makes firing even more of a hit-and-miss affair than usual. The handgrip button on the review sample refused to work but this may be a problem with that particular stick – the luck of the draw.

diagonal sensing. This means that diagonal sensitivity is a good test for an all-purpose, quality joystick.

In the individual surveys, the Details column indicates the supplier, colour of the base, handle colour, direction-sensing switch type, firebutton colour, fire-switch type, and diagonal sensitivity (DS). The grading for DS is based on the rising scale: poor, good, very good and excellent.

The Comments column forms a subjective appraisal of each stick and outlines any special features which the stick may possess.



The joysticks in order of preference

The Navigator
Blaster
Competition Pro
Competition Pro 5000
Magnum
Joystick Controller
Tac 30
Slik Stik

and a special mention for the IconTroller as a suitable second buy.



Model/Price	Details	Comments
Competition Pro 5000 **£15.95**	Dynamics Transparent base Red handle microswitches Dual red buttons DS: Very good	Although the direction sensors are microswitched,the fire button uses lower quality contact switches on plastic mounts which are susceptible to stress fractures. The handle has a positive feel and the unit is comfortable to hold.



Model/Price	Details	Comments
Joystick Controller **£4.99**	Suncom/ Microprose Black handle Black handle bubble switches Single red button bubble switch DS: good	This is a later version of the 'Atari' which earned an excellent reputation as the official eight-bit stick for that company. Commodore owners soon realised that there was direct compatibility and forsook the official, dismal CBM stick for this dumpy delight. Time has not been kind to the JC, but it can still hold its own against the other cheap sticks and is a good throwaway for those on a limited budget. For a bubble switched stick it is surprisingly responsive and reliable and is the only stick ever to have a replaceable switch board. Sadly, it's usually the handle that breaks off. The position of the firebuton makes this a right-hander's joystick.



Model/Price	Details	Comments
Slik Stik **£6.99**	Suncom/ Microprose Black body Orange/ black handle contact switches Single orange button contact switch DS: poor	Despite the neat compact design, this stick is very unresponsive. The root of the problem may lie in its unusual direction-sensing switch arrangement, as outlined earlier in this article. The positive contact of the rod with the plates isn't helped by the grease placed in the well to reduce friction. As a non-conductor, the lubricant is designed to coat the handle stem and can make electrical contact difficult. Diagonal sensing is abysmal and the firebutton is right-handed.



Model/Price
Blaster
£12.95

Details
Replay/Compumart
Black/red base
Red handle
microswitches
Dual red buttons
microswitches
DS: very good

Comments
Although this looks almost exactly the same as the Competition Pro sticks, it does have a slight edge. The direction sensing, though adequate, could be improved by thickening the stem of the handle slightly. The autofire switch is sensibly positioned at the front of the base so that it can be switched on and off easily while a game is in play. Compared to the Navigator's system, this is the next best answer to overshooting.



Model/Price
Navigator
£14.99

Details
Konix
Black base
Blue handle
microswitches
Single blue trigger
microswitch
DS: Excellent

Comments
The Navigator is the new pistol-grip stick from Konix and it looks like a refugee from a Sixties' science fiction movie. In fact, it's almost a dead ringer for a *Star Trek* phaser. On first sighting, the stick received a cool, if not derisory, reception in the office but its superior, smooth performance quickly won everyone round. The diagonal sensing is really excellent and the design of the Navigator is a lot more comfortable than the Magnum. The positioning of the firebutton as a pistol trigger means that the index finger can be used, which should make it more natural for first time users. The autofire switch does not operate until the trigger is held, which makes it excellent for most games and avoids the possibility of overshooting through high score tables and menu screens. A brilliant stick which shows that Konix has come a long way since its quirky Speed King design.



Model/Price
IconTroller
£13.99

Details
Suncom/Microprose
Cream base
Grey handle
bubble switches
Single grey button
bubble switch
DS: good

Comments
This is not a gamers stick and it doesn't even pretend to be one. It is designed for use as an icon and pull-down memory selector and, as such, it works very well. It is designed as a permanent attachment to the computer keyboard, and the plug has a second input port on it so that a conventional joystick or mouse can be connected simultaneously. As an aid to GEOS, art packages and music makers, it is well thought out and convenient. I even tried it on an Amiga 500 and the coiled cable could just stretch far enough. Although the connection arm is fitted with a sticky pad, I feel sure that most users will want to bolt this one on more permanently.

Relative File Programming

In previous articles we have looked at how to create, enter and process RECORDS, keep housekeeping files separate and update them. Now we have arrived at the most challenging series of routines of all – deleting records

By Eric Ramsay

Why should deleting records be so complex? Why not simply overwrite the RECORD with a CHR$(255), remove it from the RSRT%() sorted RECORD number array, and that would be it, wouldn't it?

Well it's not quite that simple. If a file contained 100 RECORDS, for instance, and the user deleted 30 of them, and then entered thirty more RECORDs the File would not contain 100 RECORDs, but 130: the thirty RECORDs he had previously deleted would still be within the File, lying fallow, as it were, taking up File space but doing nothing.

So we have to aim, in the Delete RECORD programming, to do the following:

- Delete the actual RECORD from the file.
- Delete the RECORD in the sorted RECORD array.
- Store the number of the deleted RECORD in a delete RECORD array
- Assign any enter RECORD operation to the first deleted RECORD in the delete RECORD array, then remove this entry in that delete RECORD array, and store the new RECORD in the sorted RECORD array.

Delete record routine

I have found this routine useful in the browse menu – after all, you have to be looking at the RECORD in order to decide whether to delete it. This routine completes the browse option programming.

The first lines are quite straightforward; they merely check that the user has not pressed the 'D'elete key by mistake.

```
3280 rem **** delete record subroutine ******
3290 print"DELETE RECORD:— Are you SURE (y/n)"
3300 getkeyyy$:ifyy$="n"then 2760:rem ***return to Browse
```

Having received confirmation, the RECORD deleted counter, DREC, is incremented by one. The current RECORD number is then stored in the deleted RECORDs array ROUT%(). Now the write RECORD variable WREC is assigned to the RECORD number to be deleted, and DISK$ is declared as the create character, CHR$(255). Then the write RECORD subroutine is used to overwrite the current RECORD. BASIC2 users, do not forget your record pointers routine 4114 before you go the write RECORD.

```
3310 drec=drec+1:rout%(drec)=rsrt%(disp)
3320 wrec=rsrt%(disp):disk$=chr$(255)
3330 gosub4080
```

There, the RECORD is deleted. But the number is still in the sorted RECORDs Array, RSRT%. This means that the RECORD will still appear if you ask for that sorted number. Clearly, this will not do. We have to delete the RECORD entry in the array. We start a loop beginning from the number to be deleted and running through to the end of the file, RN:

```
3340 forpo= disp to rn
```

Now we assign the RSRT% number for the deleted RECORD to the next RECORD entry in the array, and so on through the loop.

```
3350 rsrt%(po)=rsrt%(po+1)
```

At the end of the loop, the deleted

RECORD number has disappeared, and RN is now 1 too many, since we have just deleted a RECORD. So 1 is deducted from RN, and also from the FINish variable in the browse mode:

```
3360 nextpo:rn=rn-1:fin=fin-1
```

And then we return to the Browse Routine;

```
3370 goto 2820
```

So the deleted RECORD no longer holds any data in the file, but the physical RECORD space still exists. We now have to program to enable that RECORD to be used in the next enter RECORD operation, otherwise it will be ignored forever, wasting file space.

We add the following Line to the enter RECORDS routine. This detects if there are any deleted RECORDs on this file using the deleted RECORD counter DREC:

```
2570 ifdrec >0then gosubb 3390: go to 2600
```

If there are deleted RECORDs, the following subroutine is called:

```
3380 rem **** assign deleted record for a write *
```

Since we will always want to use the first deleted RECORD from the array, the WREC variable for the write operation is assigned as ROUT%(1). The sorted RECORD array is given this number, and then the same number is deleted from the delete RECORD array, ROUT%, using the same kind of loop you have already seen.

```
3390 wrec=rout%(1):rsrt%(rn)=rout%(1):forpo=1 to drec: rout%(po)=rout%(po+1):nextpo
```

Then, since we now have 1 less deleted RECORD, 1 is deducted from the delete counter, DREC, and the program RETURNs to line 2570. The line then GOTOs 2600.

```
3400 drec=drec-1
3410 return
```

Effectively, the program has by-passed the normal RECORD number assignment in order to use a deleted RECORD. All the housekeeping is updated and the new RECORD will remain at the end of the file until the next SORT. Now we have to add a new loop to the housekeeping:

WRITE HOUSEKEEPING — BASIC 3.5+

```
200 n1$=LEFT$("HSE."+NAME$+"........",16)
210 dopen # 3,"     +(n1$),w:gosub-3610
220 print # 3,c,rn,kf,drec:gosub3610
230 for a = 0 to c
240 print # 3,field$(a):gosub3610
250 print # 3,field(a): gosub 3610
260 nexta
270 forpo=1torn
280 print # 3,rsrt%(po):gosub3610
290 next po:ifdrec=0then330:rem ** miss ROUT% if no DREC
300 forpo=1todrec
310 print # 3,rout%(po):gosub3610
320 nextpo
330dclose:gosub3610
340 return
```

READ HOUSEKEEPING — BASIC 3.5+

```
350 n1$=LEFT$("HSE"+NAME$+........",16)
360 dopen # 3,(n1$),r:gosub3610
370 input # 3,c,rn,kf,drec:gosub3610
380 for a = 0 to c
390 input # 3,field$(a):gosub3610
400 input # 3,field(a): gosub3610
410 nexta
420 forpo=1torn
430 input # 3,rsrt%(po)
440 next po:if drec=0then470:rem ** miss ROUT% if no DREC
450 forpo=1todrec
460 input # 3,rout%(po):nextpo
470 dclose
480 return
```

We have added the storage and input of the Variable DREC, and a Loop to store and input the ROUT%() Array if there are any Deleted RECORDs in the File. If there are none, both the INPUT # and PRINT # Loops are skipped.

BASIC 2 HOUSEKEEPING

I have found, while using the BASIC 2 of the Commodore 64, that PRINT # statements sometimes do not work so well writing several numeric variables to disk separated by the comma ','. If you find any difficulty in INPUTting the variables in line 370, then the PRINT # statement in Line 220 is most probably at fault. Use separate PRINT # statements for each variable:

```
220 print # 3,c,gosub3610
222 print # 3,rn:gosub3610
224 print # 3,kf:gosub3610
226 print # 3,drec:gosub3610
```

INPUTting the Variables in line 370 will then work correctly.

Sequential Search METHOD — 2 Read Method

You now have all the routines required to write and read all the RECORDs in the file. Using these routines is merely a matter of practice, and here I am going to suggest another search method which, instead of searching for a string within the KeyFIELD will search an entire file for a given string. The process is quite simple. We can break it down to the following:

- OPEN the File: INPUT the Search String.
- Limit the Search to parts of the File.
- Begin Search Loop.
- Read RECORD, Search for String
- Match found, store RECORD number.
- End Loop.
- Display RECORD numbers found, use BROWSE to Display or Print the RECORDs.
- Return to File Menu.

If you have followed this series, you will have all the routines needed to accomplish this The following is for the 1 or 2 RECORD read method. Those using the field separated method will be dealt with later.

Let us say that this routine will begin at the line 1000. Of course, you may RENUMBER any of the routines as you wish.

```
1000 rem**** File Search Routine.
1010 rs=0:dopen # 5,(name$),(1rec),d0,u8:gosub3610
1020 print"[clrscreen]":fora=0toc
1030 print"Field "a+1;tab(?)"Subject "Field$(a):nexta
1040 print"Input Search Data ?"
1050 input se$
1055 gosub 4210: rem **Limit Routine
1060 print "[clearscreen] Record
```

```
Processing Now."
1070 forpo=beg to fin:print"[home]"po
1080 print "Matches Found ";rs
1090 rrec=po: rem File RECORD
Number used
```

At this point, the screen has been cleared, (or WINDOWed if you have a C128) and the SEarch$ has been INPUTted. A message is displayed and the currect RECORD number being accessed is displayed.

You may wish, at this point, to have the RECORDs accessed in sorted order, or sequentially: it is entirely up to you. As the read RECORD number variable, RREC (or RP for Basic 2 users) is declared, this can either be the file RECORD number, here the loop label PO, or the Sorted RECORD number can be used:

```
1090 rrec =RSRT%(po): rem Sorted
RECORD Number used.
```

The search result will be the same, except that by using the sorted RECORD number the RECORDs matched will be in sorted order, but because the read/write head on the drive is skipping about the file finding these sorted RECORDs the search will take slightly longer.

Whichever you choose, the assigned RECORD is Read:

```
1100 gosub 4120:    rem *** Read
RECORD
1100 gosub4114:gosub4120:rem for
BASIC 2 users
```

Now, instead of breaking up the DISK$ collected record string, we use it in one go to search the entire RECORD, and if a match is found, the RECORD number is stored in the RESult array, RES%.

```
1110 if instr (disk$,se$) 0thenrs=
rs+1:res%(rs)=rrec (or rp for BASIC
2)
```

Because here the Array (RES%() is used to store the RECORDs matched, this array will need to be DIM'd. If you anticipate many RECORDs in a file, particularly those BASIC 2 users with comparatively low RAM to use, it may be better not to use an array to store the result, but to print the RECORD matched, either to printer, or to the screen. A separate subroutine would be best here. Another possibility is to OPEN a separate sequential file, and simply PRINT # the RECORD number matched to this file, for later reading and displaying, in which case you would have OPENed the sequential result file before the Loop PO began:

```
1015 dopen #3,(left$("result"
+name$,16)),d0,u8,w:gosub 3610
```

and the search line of the routine would then be:

```
1110 if instr (disk$,se$)>0thenrs-
=rs+1:print # 3,rrec (or rp for BASIC
2)
```

BASIC 2 users already have their own search string routine which will take the place of INSTR, which can be copied and placed here:

```
1110 fors=1tolen(disk$)-len(se$)-1
1113 ifmid$(disp$(a)),s,len,(se$)=
se$thens=len(disk$(-len(se$)
1:rs=rs+1:print# 3,rp: goto 1120
1116 nexts
1120 next po
1130 dclose:gosub3610
1130 [BASIC 2] close 3:close5
```

At the end of the Loop every RECORD in the file will have been searched for the string, and the numbers of the RECORDs matched will either have been stored in RES% or in a sequential result file.

The Routine would then continue like this:

```
1150 print"[clear screen] Result of
Search for "se$
1160 rs " Matches Found."
1170 if rs = 0 then ?"Press any key
for Menu."
1180 forpo=1tors:    rem * Start
result Loop
1190 rrec=res%(po):gosub4120:rem **
Read RECORD
1200 disp=res%(po):gosub4290:rem
**** Display Record
1210 ?"Press any Key for
NextMatch":getkeyzz$
1220 nextpo
```

FIELDs SEPARATED METHOD

If you elected for the FIELDs separated method of writing and reading the RECORD than you must make some changes to the sequential search routine. Since you do not have a DISK$ and the RECORD returns from the read routine already divided into the FIELDs array DISP$ you will have to search the RECORD within a loop. Make these changes. These are for the sequential disk file method of storing the results.

SEQUENTIAL SEARCH FIELDs SEPARATED BASIC 3.5+

```
1105 for a =0toc
1110 if instr (disk$,se$)>0thenrs=rs
+1:print # 3, rrec (or rp for BASIC
2)
1116 nexts
1120 next a, po
```

SEQUENTIAL SEARCH FIELDs SEPARATED BASIC 2

```
1110 fors=1tolen(disp$(a))-len(se$)-1
1113 ifmid$( disp$(a)),s,len(se$) =
se$thens=len(disp$(a))- len(se$)-
1:rs=rs+1:print # 3,rp:goto 1120
1116 nexts
```

SEQUENTIAL LISTING OF RECORDS

Another form of output which you might consider useful is the listing of RECORDs, either to printer, disk or screen. I will detail a simple routine now which you may adapt to suit your particular needs. My own programs use this sequential listing routine to output the results of searches as well as straightforward lists. However, I shall leave you to accomplish that with your own changes to the following Routines:

```
1300 dopen # 5, (name$),(1rec),d0,-
u8:gosub3610
1310 1c=0: rem**** List Counter set
to 0
1320 print"[clrscreen]":fora=0toc
1330 print "Field "a+1;tab(?) "Subject
"Field$(a):nexta
1350 print "Which Field to List?":
1360 gosub3430:n(lc)=n-1:rem ** n()
will need DIM
1370 print"Another Field to List?":get
keyyy$:if yy$="y" then goto 1230:rem
**** get another Field
1380 gosub 4210:    rem **Limit
Routine
1390 print "[clearscreen] Record
Processing Now."
1400 forpo=beg to fin:print"[home]"po
1410 print "Matches Found ";rs
1420 rrec=po:    rem File RECORD
Number used
1420 [for BASIC 2] rp=po:gosub 4114
```

If you require the list to be in sorted order, you will need the RECORDs to access the sorted RECORDs array, like this:

```
1420 rrec=rsrt%(po):rem ** access in
Sorted Order
1420 [for BASIC 2]:rp=rsrt%(po)
```

Then the RECORD is read and put into the field array, DISP$():

```
1430 gosub4130:gosub 4180
```

and Listed, in this example, to Screen:

```
1440 for a =0tolc:print
disp$(n(a));:next a:print
1450 Nextpo
1460 dclose
1470 goto ? [wherever your File Menu
begins.]
```

Of course, the above example merely lists your RECORDs to the screen. You would add a request at the beginning of the routine to request the type of output required by the user, and then program the appropriate output, but the output loop remains the same. Note that this has changed from the ordinary field loop,'

FOR A = 0 TO C'

to

'FOR A = 0 TO LC: PRINT DISP$(N(A)):NEXT A

Which will display only those fields requested by the user.

Those of you who have used the FIELDs separated method will not need to use the separate RECORD into FIELDs routine, since your RECORD returns from the READ routine already read into the array DISP$().

There you have it–: all the routines necessary to program your own relative files. Now let us look at a layout of a typical relative file program to assist you in the planning of your own.

PROGRAM PLANNING

Exactly which routines you include in your own programs depends much on what you want it to do. If it is a dedicated program, for instance, you will not require the FIELD pointers routine, since the FIELDs will always be exactly the same whenever the program is RUN. But let us look at a typical program layout for a variable relative file.

This program would be required to produce any number of different files. Use the routines along the line. Be careful to include the general variables required before using the read and write routines or there will be unpredictable results.. Follow these general rules:

- Always declare the current RECORD number before using the read or write routines. Depending on the part of the program this RECORD number can be PO, DISP or RN.
- If the RSRT% array has been used in the RECORD number declaration then always ensure that it is used when BOTH reading and writing the RECORD.
- When DOPENing both relative and sequential files, ALWAYS use the 'optional' D0,U8 in the Statements. Although the statement will work well without it, if the drive and device numbers are omitted then only two channels may be used at the same time, instead of three. Only one relative file may be DOPENed at the same time.
- Always give the RECORD statement [or PRINT # 15,"p" for BASIC 2] twice. This eliminates any chance of a DOS error when accessing the RECORD.
- Use the disk check routine on EVERY drive access.
- DO NOT forget to DCLOSE the files when access has finished, or data will be lost. Remember, DCLOSE closes ALL open channels, so ensure that all processing has been completed before the DCLOSE statement is encountered by the program. BASIC 2; Leave the command channel 15 OPEN all the time, but do not forget to CLOSE all files at the end of processing. The best way of ensuring this is that the LAST file channel OPENed should be the FIRST to be CLOSEd.

Now here is the Program layout;

FILE LAYOUT — RELATIVE FILES

TITLE SCREEN
PROGRAM MENU:

Create New File	Create Routine	Save Housekeeping	Goto File Menu
Load File-	Load Housekeeping	GotoFile Menu	
Leave Program -	Quit Program		

FILE MENU

Enter RECORDs	Increment Counter RN	Input RECORD Routine	Write RECORD routine	Return to File Menu
Browse RECORDs	Display Routine	Limit routine	Copy Delete Print Search	Return to File Menu
Search RECORDs	Sequential Search Routine		Read RECORD, Match	Return to File Menu
Print Template	Print all FIELDs and LENgths, and Variables to Printer			Return to File Menu
Change KeyFIELD	Change KeyFIELD Routine 400		Save+ @ new Housekeeping	Return to File Menu
Sort RECORDs	Sort RECORDs only			Return to File Menu
Sequential List	Get FIELDS to List	Limit Routine	Read RECORDS, List	Return to File Menu
Exit Program	Save+ Housekeeping	Go to Program Menu		

That Was The *Commodore* Year That Was

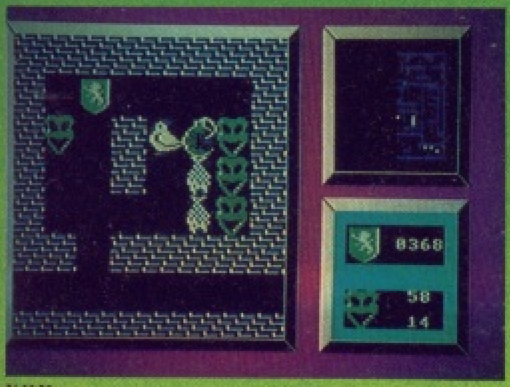
1988 has been a busy year for C64 and Amiga owners, so here is a potted history through the pages of Your Commodore

January

As the snow comes and American Football fans stay up late to watch the Washington Redskins winning the Superbowl, the price of the Amiga is reduced to £499.99, after weeks of speculation, and is bundled with *Deluxe Paint* and *The Very First* tutorial pack. Domark release *Star Wars*. EA is skating or dying, and Mosaic launch the long-awaited but disappointing *Yes, Prime Minister*. Other big games are *Freddy Hardest* (Ocean/Dinamic) and *Zig-Zag* (Image Works).

February

Commodore sponsors Tessa Sanderson in the hope of mass TV coverage when she goes for gold in the Seoul Olympics. Argus Press Software's management buys the company and forms Grandslam Entertainments.



XOR

Top game of the month is Microprose's *Airborne Ranger*, with Logotron's *XOR*, Mirrorsoft's *Tetris* and Infocom's *Nord and Bert* worthy of honourable mentions.

March

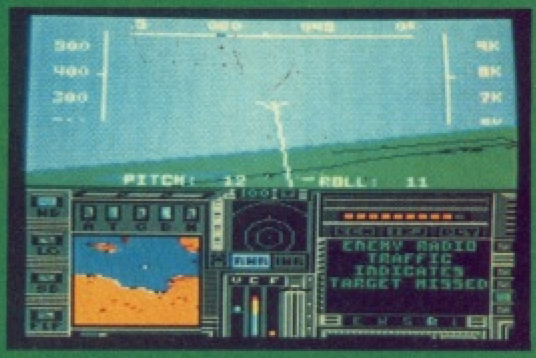
Montbuild announce that the PC Show will be held at Earls Court instead of Olympia in September. The Hewson versus Telecomsoft argument that started at last year's show rumbles on as Telecomsoft is allowed to release *Morpheus* and *Magnetron*. Alternative Software signs up the rights to the back catalogues of – *Piranha, Audiogenic, Incentive* and *Bubble Bus*, meanwhile Mastertronic picks up Activision's titles.

April

The Commodore jinx strikes as Chelsea, complete with CBM logos on their shirts, is relegated to Division 2. The cartridge war heats up with the launch of *The Final Cartridge III* and *Action Replay IV*. Ocean releases its game based on the multi Oscar-winning film *Platoon*, and Rainbird continues to set new standards in adventures with *Jinxter*.

May

Micro-maestro, Rob Hubbard, who was doing rather well over here, decides to go over there as he joins Electronic Arts in California. The Americans were obviously very impressed with his music for games such as *Crazy Comets, Monty on the Run, Sanxion* and EA's own *Skate or Die*. Logotron releases its *1295* series of low-cost business programs which offer an integrated suite of wordprocessing, database and spreadsheet programs for only £12.95 each. The Power House goes solo, and the top games are *4th and Inches* (the last of Accolade's games for US Gold before



Project Stealth Fighter

signing up with Electronic Arts) and Microprose's *Project Stealth Fighter*. Gallup claims Amiga software sales have trebled. and new viruses infect the Amiga.

June

At the Commodore Show the Amiga drops in price again, from £499.99 to £399.99, and the C64 is bundled in the Commodore Olympic pack comprising a C64, datasette, joystick and ten sports games for only £149.99. Grandslam signs a deal with Datasoft that brings *Alternate Reality* to the UK and takes the *Hunt for Red October* to the States. The Power House signs up Canada's Sydney Development Corporation, famous for games such as *Dambusters* and *Fight Night*, which formerly released its games through US Gold. *Your Amiga* goes solo. EA's *Strike Fleet* brings modern naval warfare to the C64. Activision changes it's name to Mediagenic. Code Masters launches £2.99 disk software.

July

Code Masters announces the *Race Against Time*. EA releases *Bard's Tale III* and the surprise of the year, *Wasteland*. Cosmi defects from US Gold to release their games through Microprose and promptly produces


Interceptor

one of its best games – *The President is Missing*. *MUD* (Multi-User Dungeon) breaks free from its modem constraints and appears on the C64. EA's *Interceptor* sends Amiga game

sales soaring to new heights. Mirrorsoft also changes its name in the hope that Image Works.

August

Commodore cuts the cost of its PC1 from £499.99 to £369.99 to take on the Amstrad PC. US Gold signs a deal with Pepsi and new label, Kixx, gives some of their old titles a second stab at the charts via the budget market.



Gauntlet

This time round the cost is £2.99 for old favourites such as *Gauntlet* and *Metrocross.* CBM cuts the cost of its PC once again, this time it's price is £315. The Power House goes under.

September

September is dominated by the PC Show at Earls Court and is heralded by an amicable end to the Hewson Telecomsoft dispute. At the centre of the Show is Commodore's mausoleum, (well that's what it looks like), where the abilities of the Amiga are shown off to an admiring public as the stage is set for further Amiga and C64 announcements. The £399.99 Amiga will now have a TV modulator bundled with it and the C64 is to be bundled in two new packs: the Hollywood Box costing £149.99 and comprising a C64, datasette, joystick and ten TV and film theme games, and the Commodore Home Entertainment Pack (£199.99), that also features a personal stereo and a Yamaha SHS-10 electronic keyboard. *Track Suit Manager* surprises many (including its producers, Goliath Games) by toppling *Football Manager II* from the top spot.

October

The Commodore jinx strikes again as Tessa Sanderson fails to qualify for



Red Storm Rising

the javelin final at the Seoul Olympics. US Gold releases the first of its Dungeons and Dragons games, *The Pool of Radiance.* Microprose goes Commie bashing in the computer game version of Tom Clancy's *Red Storm Rising.*

November

Now I must reach for the crystal ball again as deadlines and production schedules mean that I have to write this before the Commodore Christmas Show, where more major announcements are expected. Will the C64 be bundled yet again? Who will Commodore jinx next? One thing is looking certain – that is set to be a shortage of Amigas.

December

The big guns boom this Christmas with Ocean's *Operation Wolf,* Activision's *After Burner* and US Gold's *Thunderblade* competing for the top spot.

As part of this roundup of the year, we've selected our personal favourites from the products that have provided the highlights of the year. This is never an easy task, and we're sure you'll



disagree with at least half of our selections. So, instead of sitting there foaming at the mouth, put pen to paper and tell us what you think.

Best Sports Game

4th and Inches by Accolade

Sports games have never been better, in a year when the legendary *Football Manager* finally had a sequel but was robbed of the glory by Goliath's *Track Suit Manager.* Daley Thompson had another *Olympic Challenge* but failed to win a medal, *LeaderBoard* went *World Class* and EA produced the bizarre *Mini-Putt.* Epyx continued it's *Games* series with the *Winter Edition* and then the *Summer Edition* but we finally opted for *4th and Inches* as it recreates the action and excitement of American Football (not an easy task) in a very playable form.



Best Role Playing Game



Wasteland by Electronic Arts

RPG is a category that has grown in maturity this year and has finally broken free from adventures and the straitjacket of linear problems and text descriptions. The late fulfillment of the promised release of *Ultima V* has left the way open for others and, despite the excellent Dungeons and Dragons game, *Pool of Radiance,* and EA's *Bard's Tale II* and *III,* the award must go the *Wasteland* which appeared out of the blue and amazed all who played it. The scenario was imaginatively set in post-holocaust America and added special skills to the arsenal of the players.

Best Adventure Game



Corruption by Rainbird

Rainbird, with the considerable help of Magnetic Scrolls, took adventures about as far as they could go with *Corruption.* Although Infocom, the past masters, had minor hits with *Sherlock,* the intriguing *Borderzone* and the confusing *Nord and Bert Couldn't Make Head or Tail of It,* it lost out as Rainbird turned to stunning graphics which have given adventures a new lease of life.

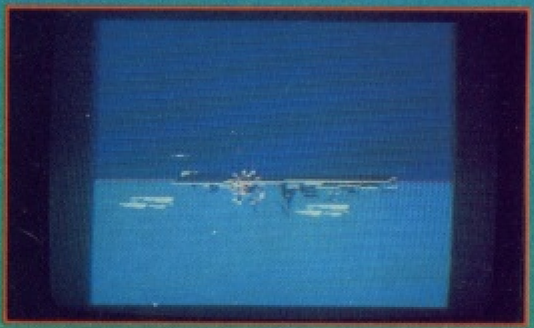
Corruption is exceptional in its concept and execution, and proves that you don't need magic and monsters to create a gripping adventure.

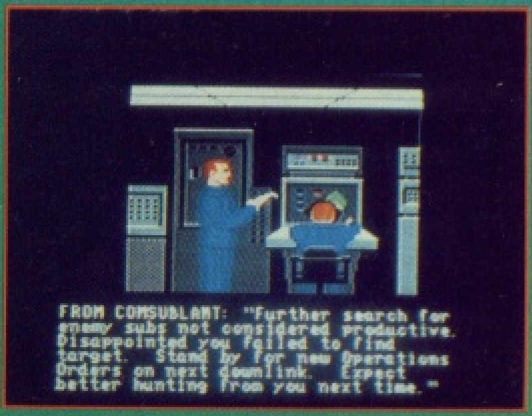
Best Strategy Game

Red Storm Rising by Microprose

We had plenty to shout about in this category with Electronic Arts releasing *Patton vs Rommel* by Chris Crawford, while introducing Australian wargamer, SSG Strategic Studies Group), with its unique style of games which includes *Halls of Montezuma, Russia* and *Decisive Battles of the American Civil War.*

It was also EA who introduced the UK to a new breed of all-action strategy game with *Strike Force,* but Microprose stole the show with *Red Storm Rising,* which added depth and variety to the real-time strategy genre and proved that wargaming could be more than just chess with knobs on.





Best Simulation



Track Suit Manager by Goliath Games

Microprose certainly changed the elitist attitude towards flight simulators with *Gunship* and this year's follow up, *Stealth Fighter,* certainly carried on the tradition. Maybe before the year is out, Digital Integration's *F-16 Combat Pilot* may add new dimensions to this particular area of simulation.

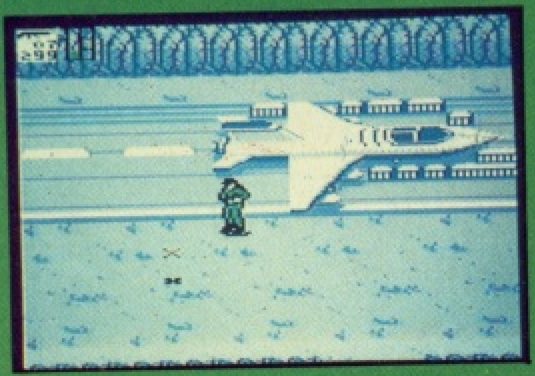
Although a certain company seems to think that any old game can be described as a simulator, we did think that the popular concept of flight sims was too narrow and decided that the time had come to move the goalposts and award our accolade to a sports simulation with a difference.

Track Suit Manager may not be the purists idea of a simulator, but Goliath Games' first release certainly takes in every aspect of an International Soccer manager's life. From the cries of adulation when things go right, to the hue and cry of the Press when things go wrong, the success of the team rests fairly and squarely on the shoulders of the team manager in this game. In fact, if more people tried playing *Track Suit Manager,* a certain real life manager might be getting a more sympathetic hearing at the moment. From the dreary design of *The Double* comes the most convincing simulation of real life that we have ever seen.



Best Arcade Game

Airborne Ranger by Micro prose



Once again Microprose pop up with a game which was also considered under the Simulation category. With its novel approach to arcade-style, war-based games, *Airborne Ranger* is to *Commando* what *The Bard's Tale* is to *PacMan.*

This was the most hotly fought decision but some of the candidates had to be ruled out by default. We would dearly have liked to have been able to award this cataegory to Activision's *After Burner,* Ocean's *Operation Wolf* or US Gold's *Thunderblade,* but their late appearance means that they will have to fight it out with the 1989 nominees.

Other games which were considered were Grandslam's faithful conversion of *PacLand,* Palace Software's fast and furious *Rim Runner,* Imagine's brilliant *Salamander* and Image Works' *Foxx Fights Back* for its novel, tongue-in-cheek approach. Microprose came in first because of the originality and variety of the gameplay plus the superb graphics.

Best Software House

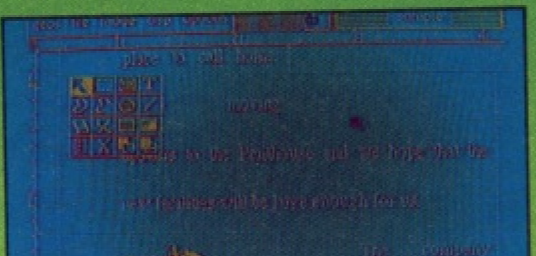
Electronic Arts

Obviously, the likes of US Gold and Ocean are always in the running and Image Works and Mediagenic have marked their name changes with a line-up of vastly improved games. However, Electronic Arts has produced a steady string of hits including *Skate or Die, Strike Fleet, The Archon Collection* and *Lord's of Conquest* and, through it's associated companies Accolade, SSG and Interplay, classic games including *Bard's Tale III, Wasteland, Power at Sea, The Train* and *Halls of Montezuma.*

Best Business Package

GeoPublish/Microprose (Berkley Softworks).

GeoPublish, turned the GEOS operating system into front page news with this desktop publishing utility that has features to rival many of its 16-bit counterparts, but for a fraction of their cost.



For sheer value-for-money and power the Logotron 1295 series almost stole this award with the Filer 1295 database, Planner 1295 spread sheet and Writer 1295 wordpro providing a compatible, interactive business package.

Best Productivity Tool

Big Blue Reader



This is a genuinely useful program, providing a pathway to swap data between the C128 and the MS-DOS environment of an IBM PC or compatible. Using the multiple formatting capabilities of the 1571 disk drive, Big Blue Reader not only allows the retrieval of information from a 5.25 inch MS-DOS disk, but also allows the C128 to write to this format too.

Best Programmers Utility

Action Replay Professional IV by Datel Electronics

As handy utilities, it is hard to beat today's cartridges. There were four competitors: *Action Replay, Final Cartridge III, The Expert* and *Freeze Machine.* All excellent candidates for praise but we thought that *Freeze Machine* was a little limited, *Final Cartridge* tried to do too much and failed, and *The Expert* had the mixed



blessing of a RAM-based system. Only *Action Replay* seemed to supply the best of all worlds with the fastest turbo system, a useful sprinkling of extra Basic commands and a disassembler which also contained special disk commands as a bonus.

Minibase 128

Need to keep tabs on your stamp collection? Or do you have more serious uses? Minibase may be the answer

By Martin Parker

Minibase is a very simple way of storing anything from a mailing list to an index of your record collection on a C128.

The first thing you will need to do when using it is to create a file. Once you've keyed the program in, RUN it and you should see a main menu as follows:

1. CREATE FILE
2. LOAD FILE
3. DELETE FILE
4. DISPLAY DIRECTORY
5. RENAME FILE
6. CLEAN UP DISK
7. COPY FILE
8. VIEW RESIDENT FILE
9. ERASE RESIDENT FILE

A. PRINTER OUTPUT ON/OFF

These are largely self-explanatory, but it's worth running through a few details. For a start Minibase operates wholly on memory – it only uses the disk to load/save the file you are operating on in memory – the resident file.

Creating a file requires you to enter a filename which must be between one and 16 digits long. You can then specify how many records you want in your file, followed by the number of fields you want in each record, which can be anything from one to 20.

Next you must specify a name for each field, which will be the same for all records. Each field name can be up to 30 characters long.

You can then enter the data record by record. The computer will prompt you with the record number and field name. Data of up to 40 characters long can be entered. Entering a null character (" ") will result in a "–" being placed in the field.

Once you've created the file, you can save it to disk.

You can get the file back by using the LOAD FILE option on the menu. Once you've loaded the file, the system gives you a list of file parameters, which consists of the filename, number of records and number of fields per record. Pressing a key will then give you a list of field names.

Finally, pressing another key will give you the sub-menu, which allows you to operate on the file. This reads:

1. VIEW A RECORD
2. PRINT FILE
3. SEARCH FOR RECORD
4. AMEND FILE
5. RETURN TO MAIN MENU

Option 1 requires you to enter the number of a record, which will then be displayed for you. The second will do the same as Option 1, but send the data to the printer.

Searching will ask you to set up a search template, by entering a search record, field by field. You can of course leave any field blank, if you don't care what goes in it.

Amending a file requires you to enter the record number you wish to change. The record will be displayed for you to change. Following changes, you can save the whole file to disk if you wish.

Going back to the main menu, you can delete a file from disk with option three. The program will double check deletion with you.

Option 4 will show you the disk directory without affecting the memory contents.

Option 5 allows you to enter a new name for any of the files.

The clean-up option, Option 6, will reallocate the BAM on the disk, which will free space for more files.

The file copy, Option 7, asks you for a filename. It will then be loaded in and can be renamed and saved.

View Resident File simply switches to the file handling sub-menu, which we have already covered.

Erase Resident File clears the current memory contents.

Finally, the last option will dump a lot of output to hard copy. This will include file parameters and positive searches.

Getting it in

Minibase is supplied in the form of a Basic listing. For advice on entering this, refer to our Listings pages.

Software for Sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out

It's three o'clock in the morning. You sit at the computer keyboard having just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts HP4 IHL.
Tel: (04427) 76661

Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:

This symbol means that the program is available on cassette.

These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

AUGUST '88

MAKING MUSIC — Programs to accompany August's installment of our super music series (C64).
SHORT INTERLUDE — Overcome the problems of handling more than one interrupt with this handy routine for machine code programmers (64).
TAPE ORGANISER — A high speed program filing system for cassette users. (C64).
SPILT BAUD RATE TERMINAL — Drive an RS232 modem with this TTY software for C64 or C128.
SPRITE LIBRARY — Aeroplanes are the subject of this installment (C64).
EDUCATING SYDNEY — Create an image of the SID chip in memory so that you can see what it's up to whenever you require (C64).
SIMPLE — Give your Plus/4 the facility to use Icons and pull down menus. Available on disk only.

ORDER CODE
DISK YDAUG88 £6.00
TAPE YCAUG88 £4.00

SEPTEMBER 1988

MUSIC COMPOSER – Compose your own three part harmonies on your C64 with this superb package – disk only.
MUSICAL FX – An excellent effects generator that allows you to produce sound effects in your own C64 programs.
SAMPLER 64 – The quality may not be suitable for studio use but you can have great fun using this C64 sound sampler.
C16 Disk Monitor – A superb disk utility for C16 and Plus/4 owners (available on disk only)

ORDER CODE
DISK YDSEP88 £6.00
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OCTOBER 1988

SPRITE LIBRARY – In this instalment our sprites take on the look of the alphabet (C64)

SAMPLER 64 – See September 1988 for details (full program on both September and October disks and tapes.)
SET THE ALARM – Use the C64's in-built clock as an alarm.
JACK IN THE BOX – A handy box utility for Basic and machine code programmers (C64).
FILE EXTENSION – Modify your disk directory so that you can load all your programs with ease. (C64 disk only)
HI-RES/MULTI/COLOUR PLOTTER – A selection of plot routines for both Basic and machine code programmers. (C64)
JOYSTICK CURSOR – Let your joystick emulate the cursor keys (C64).
HI-RES FILL – A superb machine code fill routine for all graphics programmers. (C64)
CODE RELOCATION – Change your machine code programs so that they will run in any area of your C64's memory.

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NOVEMBER 1988

SECRET WRITING — Learn how to conceal messages and how to protect your Basic programs. (C64)
PAINLESS WINDOWS — Extend the power of the C128's WINDOW command.
UNLOCK HIDDEN 128 POWERS — Use the full keyset of your C128 in C64 mode.
WILLIAM TELL — Fight off the Austrian soldiers in this great C64 arcade game.
TALKING COMPUTERS — Use speech synthesisers with your C64.

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F-KEY LABELLER – Use your Commodore printer to produce a template for your function keys (C64).
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DOUBLE HEIGHT – Enhance your C64 text displays with a double height character set.
PROGRAM PROTECTION – Protect your latest C64 masterpiece from prying eyes.
SPRITE CONTROLLER – Basic sprite manipulation made easy. C64.
GRAPHIC EDITOR – A quick and simple C64 UDG editor.
MASTERING THE RASTER – The source code to accompany our article on raster interrupts. (C64)
CREATING CHARACTERS – Give your Plus/4 and Commodore printer a better print quality. Available on disk only.
WILLIAM TELL – See November for details. (C64).

ORDER CODE
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Cassettes or disks are available from March 1986. Please ring the editorial office (01-437 0626) for details of these.

ORDER FORM – PLEASE COMPLETE IN BLOCK CAPITALS

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Databases

By Tony Hetherington

Choosing a database is a daunting proposition fraught with its own jargon

The storage and processing of data is what computing is all about, whether it's your company's annual results, a character in a role-playing game or a name and address file, it's all data to a computer. When your computer is a C64 or C128 with access to tape or, more usually, disk storage media, it becomes a powerful tool that can store, search and retrieve your data.

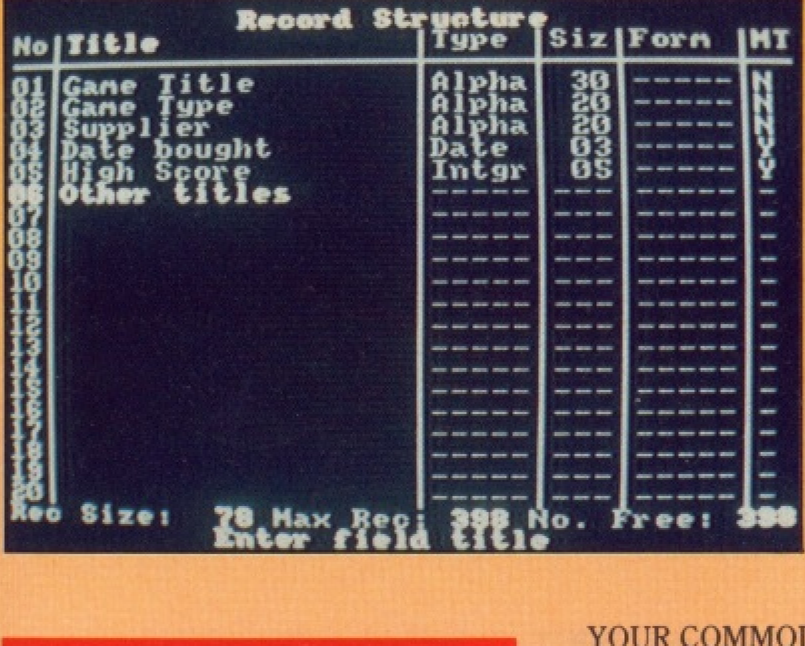
A database is a custom-designed program to help you organise your data and can be thought of as the data equivalent of a wordprocessor. When you use a wordprocessor, you type in the information you want and then use its facilities to edit and shape it the way you finally want it to appear. In a similar way, you enter your data into a database and then use its facilities to shape and use it in a variety of different ways.

In its simplest form, a database is like a card-file system, storing names and addresses of friends or business contacts. How, then, is this better than a real card system? For one thing it's more versatile, the details can be changed easily as people move or new ones appear on the scene and, once the information is stored, you can search for specific entries and, through a mail merge program, send personalised letters to everyone on your database.

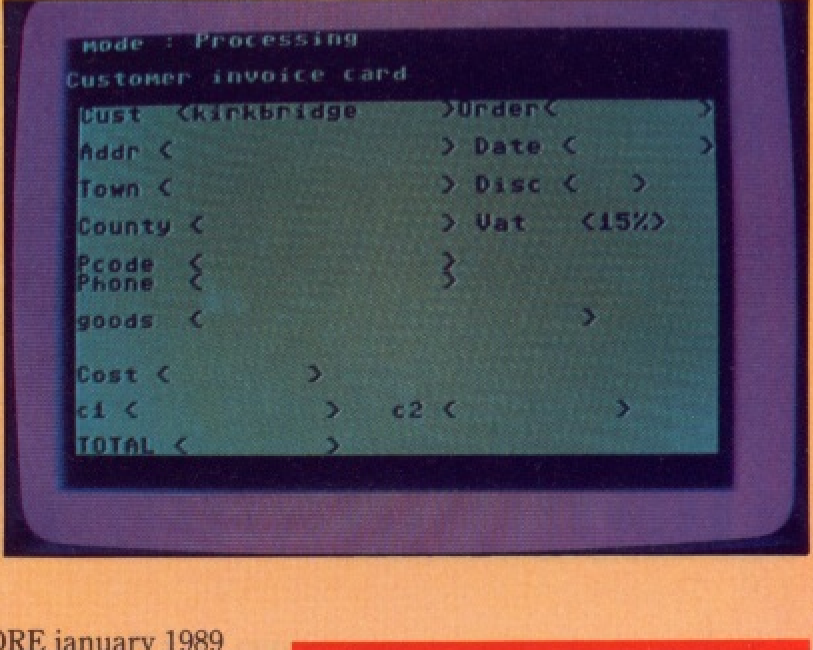
A database can go further than this as you can then select key fields (parts of your stored data) and use that to decide who should receive a letter or even which one. For example, if your database was used to store the names and addresses of the members of a video library, it could also store the films the member has borrowed and the dates that they are due back. Then, together with a mail merge program, you could send reminders only to those with overdue videos or bring news of forthcoming horror films, such as Killer Nuns III, to those who have already rented Killer Nuns I and II.

In its simplest form, a database is a file which consists of a number of records, each record containing a number of fields and each field a number of characters (the data itself). So, if we take the example of the video library, each record would be the entry for each member which would have the following fields:

Creating a database of games using Mini Office II. The fields can be longer than the screen width as it scrolls to read them.



Superbase is THE C64 database program and ideal for serious applications such as this invoice system.



Database table.

Title	Supplier	Price	Program type compatibility	Max field size	Max record size	Records per database	Programmable?	Calculations?	Comments
Superbase 64	Precision	£99	ASCII output	255chs	127 fields	Limited only by disk	Yes	Yes	The C64 database. It costs a lot more than the others but it could be worth it's weight in gold.
Filer 1295	Logotron	£12.95	Part of series	25chs	10 fields	10,000	No	Yes	Excellent value for money. It has it's limitations but for £12.95 you get a workable program.
Mini Office II	Database	£14.95	Integrated	60chs	20 fields	500 approx	No	No	A cheap and cheerful package that also contains a wp, spreadsheet, comm and graphics.
Vizastar	Viza S/W		+ spreadsheet	120chs	64 fields	65535	No	Yes	Also includes business graphics and a spreadsheet.
Micro Magpie	Supersoft	£39.95	None	35chs	24 fields	Limited by disk space	Yes	Yes	This one has a style of it's own as you program every application including adding a record.
GeoFile	Microprose	£29.95	with GeoWrite	200chs	64 fields	Limited by disk space	No	No	A "point at what you want" program and a fully integrated part of the GEOS system.

Name
Address
Date joined club
Films currently on hire
Films that have been hired

1 – Horror
2 – Adventure
3 – Comedy
4 – Western
5 – Adult
6 – Sci-Fi
Total films hired

The fields of a database do not need to be just a passive string of characters: they can also include calculations such as totals of each type of film hired and an overall total so you could quickly interrogate the database to find out who are your best customers.

Similarly, a club secretary could use a database of members to keep track of who owed subscription payments and send them reminders to settle their accounts.

As you can see, a database can be more than just a passive card-index file, because it can put the stored data to work in anything from label printing to giving a personal touch to mail-merge programs. To get the best use out of a database program it should therefore be compatible with other programs such as a wordprocessor with a mailmerge option, or with a spreadsheet for integrating important figures. One way of ensuring this is to opt for an integrated system, such as Mini Office II, or for Logotron's Filer 1295, which is part of the 1295 series, which can be built up to form an integrated system of a database, wordprocessor and spreadsheet.

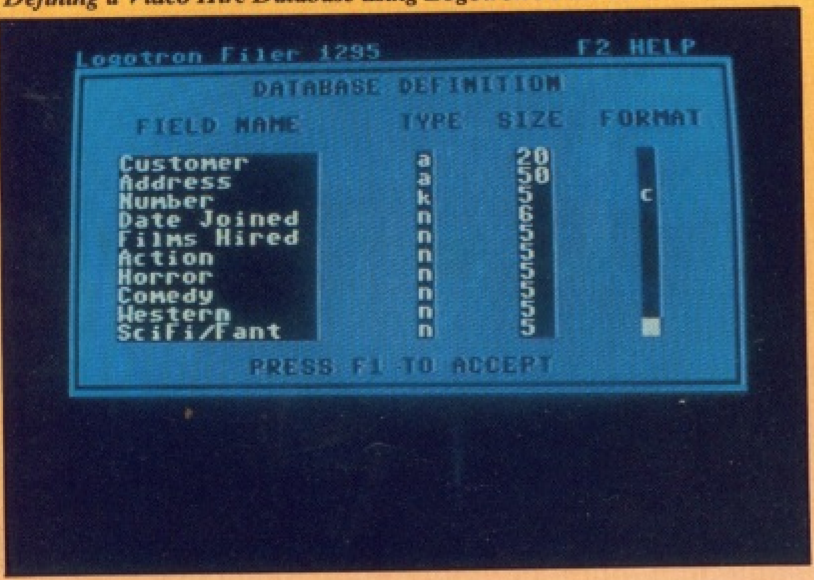
The undoubted leader for the C64 is Superbase from Precision Software. This is arguably the only true C64 database, because it also includes its own programming language through which you can devise your own applications that for example prompt your user for details of a customer order, and will then display the total price for them, taking into account customer and bulk discounts, special offers and VAT.

Choosing which database is right for you can be a difficult and confusing task. For many, it will be the price that makes the final decision but you should also consider the the number of fields per record and records in a file that the database supports, as these may limit certain applications.

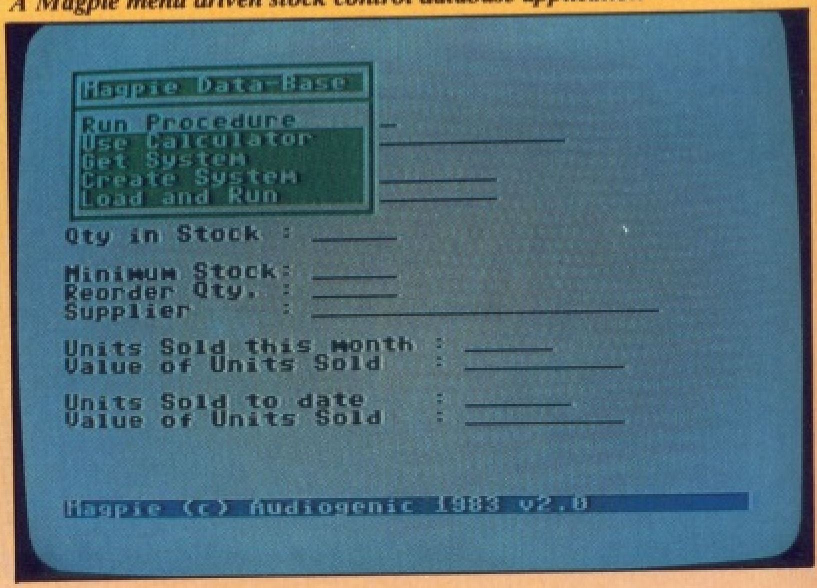
If the database outputs its files in standard ASCII format then the same files can be exchanged with non-Commodore systems, increasing its usefulness.

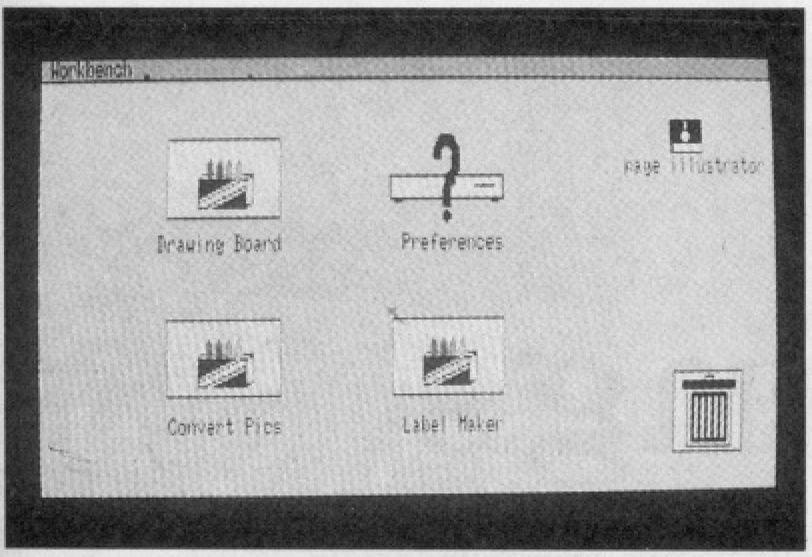
To help you find your way through this jungle, we've compiled a table that highlights some of these important features so that you can choose the right program for you.

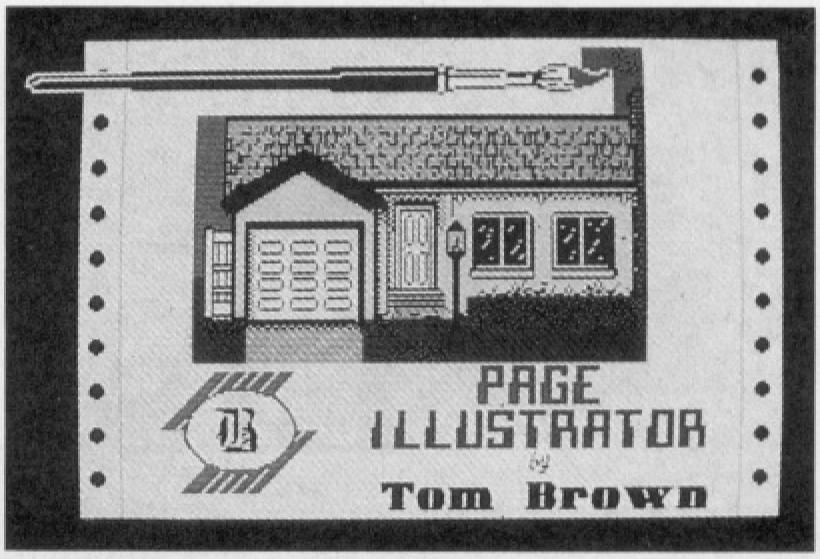
Defining a Video Hire Database using Logotron's Filer 1295



A Magpie menu driven stock control database application







Page Illustrator



One problem with the 80-column mode C128, is that it's always perceived as an accounts engine. Its graphics capabilities have usually been made little use of. The high-resolution equivalent to 80-column mode, a respectable 640 x 200 pixels, actually means that Commodore are marketing high-resolution graphics up to the standard of the BBC B or the Amstrad CPC5 (Wow!).

But the usual plaint – where's the software for it? Well, someone's looking at the problem, anyway. Home Illustrator from New Jersey-based Patech is a combination of an Amiga-type workbench and a drawing package, Home Illustrator.

This sounds like an ambitious entry, since it sounds exactly as though it provides a total operating environment. But no, I have to spit it out early in this review, Home Illustrator is an ill-considered piece of software.

The Workbench is all very well, though a little simple. It's really just a way of accessing disk files as icons using a pointer. Real Amiga-type working environments are the front end of a machine design philosophy. I've never felt that patched-on wimp systems like GEM offered the user much. This one is doubly redundant, as it struggles to make a silk purse out of an 8-bit machine.

The meaty bit of Home Illustrator is the drawing package. This is crippled by two deadly problems. It is not remotely user-friendly, and it is S-L-O-W. It is obviously written in some sort of sluggish high-level language, so waiting while you move the paintbrush around the screen can be a painful experience.

After offering a workbench, you would think that the package would offer an icon-driven paint package, huh? No chance. Home Illustrator operates in ten modes: freehand, lines, boxes, circles, text, change colour, polygons, copy, ellipses, and I/O. To access these you have to keep flipping around using, get this, not even the function keys, but Control and a numeric. On top of all this, while in a mode, you have to look up a vast range of keys to use various different functions.

Now I'm not a mouse with everything fanatic, but one thing I think drawing packages should be is friendly. This one isn't. The amazing thing is that the same company has supplied a better drawing package as a throw with their excellent Basic 8.0, so all I can say is get that and you won't need Home Illustrator.

By Fin Fahey

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:
[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]
This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:
[SS],[C*]
In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:
:CC=2*[PI]*R:
Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

```
 5 REM SYTAX CHECKER - ERIC DOYLE

 10 BL=10    :LN=70    :SA=49152
 20 FOR L=0 TO BL:CX=0:FOR D=0 TO
  15
 30 READ A:IF A>255THENPRINT"NUMB
 ER TO LARGE";LN+(L*10):STOP
 40 CX=CX+A:POKE SA+L*16+D,A:NEXT
  D
 50 READ A:IF A><CX THENPRINT"ERR
 OR IN LINE";LN+(L*10):STOP
 60 NEXT L:SYS 49152:NEW
 70 DATA 173,5,3,201,165,208,31,1
 20,169,9,141,32,208,141,33,208,1
 847
 80 DATA 169,7,141,134,2,169,13,3
 2,210,255,169,64,141,4,3,169,168
 2
 90 DATA 192,141,5,3,88,96,120,16
 9,124,141,4,3,169,165,141,5,1566

 100 DATA 3,169,14,141,134,2,141,
 32,208,169,6,141,33,208,88,96,15
 85
 110 DATA 32,124,165,72,138,72,15
 2,72,162,0,165,20,133,254,165,21
 ,1747
 120 DATA 24,101,254,133,254,189,
 0,2,240,18,69,254,133,254,232,18
 9,2346
 130 DATA 0,2,240,8,24,101,254,13
 3,254,232,208,233,169,1,141,134,
 2134
 140 DATA 2,165,254,74,74,74,74,3
 2,156,192,32,210,255,165,254,41,
 2054
 150 DATA 15,32,156,192,32,210,25
 5,169,13,32,210,255,169,13,32,21
 0,1995
 160 DATA 255,169,7,141,134,2,104
 ,168,104,170,104,96,24,105,48,20
 1,1832
 170 DATA 58,16,1,96,24,105,7,96,
 0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one Many of the listings are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time. YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

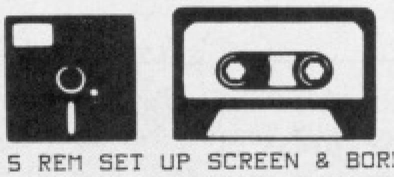
Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

YOUR COMMODORE Listings

Dazpro

PROGRAM: DAZPRO

NOTE - This program is for cassette only.



```
20   5 REM SET UP SCREEN & BORDER
       COLOURS : OUTPUT MESSAGE
3C   6 :
8F   10 POKE 53280,0:POKE 53281,0

E6   20 PRINT"[CLR,WHITE,RIGHT12]
     PLEASE WAIT"
24   30 :
EB   40 REM LOAD THE DATA INTO ME
     MORY
08   50 :
06   60 :
6D   70 REG=35050
EC   80 CHECK=0
91   90 READ BYTE
10   100 IF BYTE=-1 THEN 60000
13   110 POKE REG,BYTE
74   120 CHECK=CHECK+BYTE
B7   130 REG=REG+1
4C   140 GOTO 90
AC   150 :
9A   160 :
C4   170 REM ** THE MACHINE CODE
     DATA **
2F   180 REM ** SAVE BEFORE RUNNI
     NG ! **
84   190 :
2D   200 DATA 76,99,138,142,144,7
     3,78,84,82,79,68,85,67,73,78
     ,71,32,84
93   210 DATA 72,69,32,68,65,90,8
     0,82,79,32,87,79,82,68,32,80
     ,82,79
2F   220 DATA 67,69,83,83,79,82,4
     2,87,82,73,84,84,69,78,32,66
     ,89,32
66   230 DATA 68,65,82,82,69,78,3
     2,70,46,32,66,65,87,68,69,78
     ,5,42
0E   240 DATA 67,79,76,85,77,78,3
     2,58,42,76,73,78,69,32,58,42
     ,76,69
41   250 DATA 70,84,32,77,65,82,7
     1,73,78,32,58,42,82,73,71,72
     ,84,32
1E   260 DATA 77,65,82,71,73,78,3
     2,58,42,67,69,78,84,82,65,76
     ,73,83
28   270 DATA 73,78,71,32,79,78,4
     2,67,69,78,84,82,65,76,73,83
     ,73,78
8D   280 DATA 71,32,79,70,70,42,7
     4,85,83,84,73,70,73,67,65,84
     ,73,79
F6   290 DATA 78,32,79,78,42,74,8
     5,83,84,73,70,73,67,65,84,73
     ,79,78
AC   300 DATA 32,79,70,70,42,66,6
     9,69,80,32,79,78,42,66,69,69
     ,80,32
ED   310 DATA 79,70,70,42,67,79,7
     7,77,65,78,68,32,63,42,65,76
     ,73,71
12   320 DATA 78,77,69,78,84,32,7
     9,78,42,65,76,73,71,78,77,69
     ,78,84
F8   330 DATA 32,79,70,70,42,73,7
     8,83,69,82,84,73,78,71,32,76
     ,73,78
7F   340 DATA 69,42,79,75,42,68,6
     9,76,69,84,73,78,71,32,76,73
     ,78,69
AF   350 DATA 42,82,69,86,69,82,8
     3,69,32,79,78,42,82,69,86,69
     ,82,83
F0   360 DATA 69,32,79,70,70,42,6
     9,78,84,69,82,32,70,73,76,69
     ,32,78,65
F7   370 DATA 77,69,32,58,42,40,8
     3,41,65,86,69,32,79,82,32,40
     ,76,41
07   380 DATA 79,65,68,42,80,79,8
     3,73,84,73,79,78,32,80,82,73
     ,78
02   390 DÁTA 84,69,82,32,84,72,6
     9,78,32,80,82,69,83,83,32,65
     ,32,75
20   400 DATA 69,89,42,128,135,12
     8,135,128,128,42,255,248,255
     ,248,255,255,42,169
F1   410 DATA 1,141,11,192,32,20,
     140,169,11,141,32,208,141,33
     ,208,169,147,32
94   420 DATA 210,255,162,11,160,
     2,24,32,240,255,162,0,189,23
     7,136,201,42,240
AA   430 DATA 7,32,210,255,232,76
     ,130,138,162,13,160,7,24,32,
     240,255,162,0
75   440 DATA 189,21,137,201,42,2
     40,7,32,210,255,232,76,154,1
     38,162,13,160,38
09   450 DATA 24,32,240,255,169,4
     2,32,210,255,32,138,140,162,
     13,160,38,24,32,240,255
C7   460 DATA 169,32,32,210,255,3
     2,138,140,32,210,255,32,159,
     255,32,228,255,201
B7   470 DATA 0,240,211,173,11,19
     2,72,169,0,162,0,157,0,192,2
     32,224
AA   480 DATA 125,208,248,104,141
     ,11,192,120,169,47,133,0,169
     ,54,133,1,169,49,141,20
1F   490 DATA 3,169,234,141,21,3,
     169,0,141,32,208,141,33,208,
     169,147,32,210
E4   500 DATA 255,169,14,32,210,2
     55,169,1,141,0.192.169.0.141
     ,252,3,141,253
3F   510 DATA 3,141,255,3,169,5,1
     41,3,192,141,5,192,141,254,3
     ,169,75,141
AA   520 DATA 4,192,169,1,141,9,1
     92,32,197,145,32,115,139,32,
     199,139,32,60
D6   530 DATA 146,169,48,141,62,4
     ,141,63,4,141,64,4,141,75,4,
     141,76,4
B6   540 DATA 169,53,141,77,4,169
     ,0,141,15,192,88,76,43,155,1
     62,0,160,0
E0   550 DATA 24,32,240,255,162,0
     ,169,32,157,0,4,232,224,39,2
     08,248,96,173
A5   560 DATA 0,192,162,0,157,0,2
     16,157,0,217,157,0,218,157,0
     ,219,232,224
13   570 DATA 0,208,239,96,169,0,
     133,251,169,160,133,252,174,
     253,3,224,0,240
BA   580 DATA 14,165,251,24,105,8
     0,176,29,133,251,202,224,0,2
     08,242,174,252,3
EA   590 DATA 224,0,240,14,165,25
     1,24,105,1,176,13,133,251,20
     2,224,0,208,242
E3   600 DATA 96,230,252,76,160,1
     39,230,252,76,181,139,169,80
     ,133,253,169,4,133
5F   610 DATA 254,173,253,3,72,14
     1,1,192,24,105,23,141,2,192,
     173,1,192,141
18   620 DATA 253,3,32,138,139,23
     8,1,192,173,1,192,205,2,192,
     240,28,160,0
E3   630 DATA 177,251,145,253,200
     ,192,40,208,247,165,253,24,1
     05,40,176,5,133,253
84   640 DATA 76,220,139,230,254,
     76,2,140,104,141,253,3,32,13
     8,139,96,169,0
5C   650 DATA 133,251,169,160,133
     ,252,162,0,160,0,169,32,145,
     251,200,192,0,208
08   660 DATA 249,230,252,232,224
     ,32,208,238,96,32,249,154,17
     3,252,3,24,109,254
CF   670 DATA 3,141,252,3,173,253
     ,3,24,109,255,3,141,253,3,32
     ,138,139,160
C6   680 DATA 0,177,251,24,105,12
```

```
   8,145,251,32,18,155,32,138,1
   39,32,199
E8 685 DATA 139,32,249,154,173,
   252,3,24,109,254,3,141,252,3
   ,173,253,3,24
D1 690 DATA 109,255,3,141,253,3
   ,32,138,139,160,0,177,251,56
   ,233,128,145,251
9A 700 DATA 32,18,155,32,138,13
   9,32,199,139,96,162,0,160,0,
   200,192,0,208
3E 710 DATA 251,232
3A 720 DATA 224,40,208,244,96,9
   6,238,32,208,96,238,33,208,9
   6,238,0,192,32
30 730 DATA 115,139,96,76,82,14
   4,76,113,145,76,40,145,76,20
   4,141,76,238,141
AF 740 DATA 76,16,142,76,44,142
   ,76,209,147,32,228,255,201,0
   ,240,209,201,144
C5 750 DATA 240,206,201,5,240,2
   06,201,28,240,206,201,148,24
   0,215,201,20,240,208
7D 760 DATA 201,13,240,222,201,
   29,240,209,201,157,240,202,2
   01,145,240,204,201,17
2C 770 DATA 240,203,201,133,240
   ,181,201,42,240,70,201,42,24
   0,66,201,43,240,62
50 780 DATA 201,44,240,58,201,4
   5,240,54,201,46,240,50,201,5
   8,240,46,201,59
69 790 DATA 240,42,201,60,240,3
   8,201,61,240,34,201,62,240,3
   0,201,63,240,26
6D 800 DATA 201,96,240,22,201,1
   26,240,18,201,47,16,37,201,3
   2,240,10,174,141
62 810 DATA 2,224,1,240,32,56,2
   33,64,174,16,192,224,1,240,1
   1,32,72,142
C3 820 DATA 173,9,192,201,1,240
   ,9,96,9,128,76,69,141,76,158
   ,141,76,1
03 830 DATA 146,201,20,16,35,24
   ,105,128,174,16,192,224,1,24
   0,11,32,72,142
58 840 DATA 173,9,192,201,1,240
   ,229,96,56,233,128,32,72,142
   ,173,9,192,201
32 850 DATA 1,240,215,96,201,45
   ,16,217,174,16,192,224,1,240
   ,11,32,72,142
F5 860 DATA 173,9,192,201,1,240
   ,193,96,56,233,128,76,141,14
   1,201,58,48,156
54 870 DATA 76,59,141,32,16,142
   ,32,125,150,169,48,141,75,4,
   141,76,4,141
D4 880 DATA 77,4,174,13,192,224
   ,0,240,8,32,238,141,202,224,
   0,208,248,174
48 890 DATA 13,192,141,5,192,96
   ,173,254,3,201,0,240,10,206,
   254,3,206,5
FB 900 DATA 192,32,222,146,96,1
   73,252,3,201,0,240,9,206,252
   ,3,206,5,192
98 910 DATA 32,222,146,96,173,2
   54,3,201,39,240,10,238,254,3
   ,238,5,192,32
CB 920 DATA 195,146,96,173,252,
   3,201,40,240,9,238,252,3,238
   ,5,192,32,195
B5 930 DATA 146,96,173,255,3,20
   1,0,240,7,206,255,3,32,152,1
   46,96,173,253
EE 940 DATA 3,201,0,240,6,206,2
   53,3,32,152,146,96,173,255,3
   ,201,21,240
F5 950 DATA 7,238,255,3,32,109,
   146,96,173,253,3,201,79,240,
   6,238,253,3
AE 960 DATA 32,109,146,96,170,3
   2,249,154,173,252,3,24,109,2
   54,3,141,252,3
37 970 DATA 173,253,3,24,109,25
   5,3,141,253,3,138,72,32,138,
   139,104,160,0
6C 980 DATA 145,251,32,18,155,3
   2,138,139,173,5,192,205,4,19
   2,240,4,32,238
8C 990 DATA 141,96,32,251,142,3
   2,44,142,32,159,147,173,253,
   3,24,109,255,3
D6 1000 DATA 205,11,192,16,16,1
   73,7,192,201,1,240,15,169,0,
   141,7,192,141
C1 1010 DATA 15,192,96,238,11,1
   92,76,145,142,206,8,192,160,
   0,185,48,192,141
3E 1020 DATA 60,3,152,72,173,60
   ,3,32,72,142,104,168,200,204
   ,8,192,208,234
22 1030 DATA 192,39,16,27,152,2
   4,109,3,192,141,5,192,201,39
   ,16,15,141,254
DE 1040 DATA 3,169,0,141,252,3,
   141,7,192,141,8,192,96,169,4
   0,141,252,3
24 1050 DATA 173,5,192,56,233,4
   0,141,254,3,169,0,141,7,192,
   141,8,192,32
53 1060 DATA 138,139,96,32,249,
   154,173,252,3,24,109,254,3,1
   41,252,3,173,253
32 1070 DATA 3,24,109,255,3,141
   ,253,3,32,138,139,160,0,177,
   251,201,32,208
A7 1080 DATA 30,32,18,155,32,13
   8,139,169,0,141,7,192,141,8,
   192,96,32,18
F6 1090 DATA 155,169,0,141,7,19
   2,141,8,192,32,138,139,96,20
   1,44,240,222,201
60 1100 DATA 46,240,218,201,59,
   240,214,201,47,240,210,201,6
   3,240,206,201,33,240
E1 1110 DATA 202,201,36,240,198
   ,201,37,240,194,201,38,240,1
   90,201,172,240,186,201
07 1120 DATA 174,240,182,201,18
   7,240,178,201,161,240,174,20
   1,164,240,170,201,165,240
98 1130 DATA 166,201,166,240,16
   2,201,175,240,158,201,191,24
   0,154,160,0,177,251,201
6C 1140 DATA 32,240,115,201,44,
   240,111,201,46,240,107,201,4
   7,240,103,201,63,240
B4 1150 DATA 99,201,33,240,95,2
   01,36,240,91,201,37,240,87,2
   01,38,240,83,201
D3 1160 DATA 160,240,79,201,172
   ,240,75,201,174,240,71,201,1
   87,240,67,201,161,240
EB 1170 DATA 63,201,164,240,59,
   201,165,240,55,201,166,240,5
   1,201,175,240,47,201
C1 1180 DATA 191,240,43,238,8,1
   92,173,4,192,56,237,3,192,20
   5,8,192,240,12
86 1190 DATA 165,251,56,233,1,1
   44,8,133,251,76,131,143,76,4
   4,143,198,252,56
8F 1200 DATA 233,1,76,233,143,2
   30,252,76,31,144,238,8,192,1
   65,251,24,105,1
3B 1210 DATA 133,251,162,0,160,
   0,177,251,157,48,192,169,32,
   145,251,232,138,72
30 1220 DATA 165,251,24,105,1,1
   76,218,133,251,104,170,236,8
   ,192,208,226,32,18
20 1230 DATA 155,32,138,139,169
   ,1,141,7,192,173,14,192,201,
   1,240,15,173,10
80 1240 DATA 192,201,1,240,11,1
   73,12,192,201,1,240,7,96,76,
   255,150,76,254
BD 1250 DATA 144,76,245,148,32,
   94,139,162,0,189,180,137,201
   ,42,240,7,32,210
DF 1260 DATA 255,232,76,87,144,
   162,0,189,0,4,9,128,157,0,4,
   232,224,9
DB 1270 DATA 208,243,32,138,140
   ,162,0,189,0,4,73,128,157,0,
   4,232,224,9
C0 1280 DATA 208,243,32,138,140
   ,32,228,255,201,0,240,213,20
   1,133,240,63
9A 1285 DATA 201,94,240,60,201,
   67,240,59,201,76,240,58,201,
   82,240,57,201,75
82 1290 DATA 240,56,201,65,240,
   55,201,148,240,54,201,20,240
   ,53,201,74,240,52,201,18
1E 1310 DATA 240,51,201,146,240
   ,50,201,70,240,49,201,80,240
   ,48,32,234,255,32
71 1320 DATA 225,255,240,43,76,
   101,144,96,76,165,141,76,111
   ,148,76,249,146,76
7F 1330 DATA 35,147,76,50,146,7
   6,178,148,76,149,149,76,243,
   149,76,188,150,76
59 1340 DATA 210,151,76,240,151
   ,76,14,152,76,107,153,76,99,
   138,32,249,154,169
12 1350 DATA 0,141,252,3,141,25
   4,3,32,138,139,173,8,192,74,
   170,224,0,240
04 1360 DATA 12,138,72,32,40,14
   5,104,170,202,224,0,208,244,
   32,18,155,32,138
A1 1370 DATA 139,96,32,249,154,
   173,252,3,24,109,254,3,141,2
   52,3,173,253,3
EC 1380 DATA 24,109,255,3,141,2
   53,3,169,78,56,237,252,3,72,
   32,138
EC 1390 DATA 139,104,168,177,25
   1,200,145,251,136,136
1E 1400 DATA 192,0,16,245,160,0
   ,169,32,145,251,32,18,155,32
   ,138,139,96,206
13 1410 DATA 15,192,169,79,172,
   15,192,153,148,192,76,131,14
   5,173,252,3,24,109
40 1420 DATA 254,3,141,60,3,172
   ,15,192,205,60,3,240,224,32,
   204,141,32,249
18 1430 DATA 154,173,252,3,24,1
   09,254,3,141,252,3,173,253,3
   ,24,109,255,3
0C 1440 DATA 141,253,3,169,80,5
   6,237,252,3,72,32,138,139,10
   4,141,60,3,160
E3 1450 DATA 1,177,251,136,145,
   251,200,200,204,60,3,48,244,
   200,169,32,145,201
D0 1460 DATA 32,18,155,32,138,1
   39,96,32,94,139,169,75,141,4
   0,4,169,1,141
D6 1470 DATA 9,192,162,0,189,16
   3,137,201,42,240,7,32,210,25
   5,232,76,212,145
56 1480 DATA 96,32,94,139,169,3
   2,141,40,4,169,0,141,9,192,1
   62,0,189,171
19 1490 DATA 137,201,42,240,7,3
   2,210,255,232,76,242,145,96,
   169,15,141,24,212
78 1500 DATA 169,240,141,6,212,
   169,100,141,0,212,141,1,212,
   169,17,141,4,212
FB 1510 DATA 162,0,160,0,200,19
   2,0,208,251,232,224,10,208,2
   44,169,0,141,0
CF 1520 DATA 212,141,1,212,141,
   4,212,96,173,9,192,201,1,240
   ,170,76,197,145
13 1530 DATA 160,15,162,1,24,32
   ,240,255,162,0,189,59,137,20
   1,42,240,7,32
D6 1540 DATA 210,255,232,76,70,
   146,162,1,160,26,24,32,240,2
   55,162,0,189,50
9F 1550 DATA 137,201,42,240,7,3
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    2,210,255,232,76,94,146,96,1
    73,64,4,201,57
6E  1560 DATA 240,4,238,64,4,96,
    169,48,141,64,4,173,63,4,201
    ,57,240,4
F7  1570 DATA 238,63,4,96,169,48
    ,141,63,4,173,62,4,201,57,24
    0,3,238,62
63  1580 DATA 4,96,173,64,4,201,
    48,240,4,206,64,4,96,169,57,
    141,64,4
38  1590 DATA 173,63,4,201,48,24
    0,4,206,63,4,96,169,57,141,6
    3,4,173,62
49  1600 DATA 4,201,48,240,3,206
    ,62,4,96,173,77,4,201,57,240
    ,4,238,77
1B  1610 DATA 4,96,169,48,141,77
    ,4,173,76,4,201,57,240,3,238
    ,76,4,96
8C  1620 DATA 173,77,4,201,48,24
    0,4,206,77,4,96,169,57,141,7
    7,4,173,76
9D  1630 DATA 4,201,48,240,3,206
    ,76,4,96,32,94,139,162,0,189
    ,66,137,201
3F  1640 DATA 42,240,7,32,210,25
    5,232,76,254,146,32,81,147,1
    73,60,3,141,3
A5  1650 DATA 192,205,4,192,16,2
    23,169,0,141,60,3,32,159,147
    ,96,32,94,139
FB  1660 DATA 162,0,189,80,137,2
    01,42,240,7,32,210,255,232,7
    6,40,147,32,81
7C  1670 DATA 147,173,60,3,141,4
    ,192,205,3,192,48,223,201,80
    ,16,219,169,0
90  1680 DATA 141,60,3,32,159,14
    7,96,32,228,255,201,0,240,24
    9,201,48,48,245
02  1690 DATA 201,58,16,241,32,2
    10,255,56,233,48,170,169,0,1
    41,60,3,173,60
BA  1700 DATA 3,24,105,10,141,60
    ,3,224,0,202,208,242,32,228,
    255,201,0,240
74  1710 DATA 249,201,48,48,245,
    201,58,16,241,32,210,255,56,
    233,48,170,173,60
63  1720 DATA 3,24,105,1,141,60,
    3,224,0,202,208,242,96,169,4
    8,141,75,4
2D  1730 DATA 141,76,4,141,77,4,
    169,0,141,252,3,141,254,3,14
    1,5,192,174
96  1740 DATA 3,192,224,0,240,8,
    32,238,141,202,224,0,208,248
    ,173,3,192,141
20  1750 DATA 5,192,96,238,11,19
    2,76,221,147,173,253,3,24,10
    9,255,3,205,11
80  1760 DATA 192,16,238,173,5,1
    92,72,170,236,4,192,16,73,17
    3,14,192,201,1
1C  1770 DATA 240,18,138,72,169,
    32,32,72,142,104,170,232,236
    ,4,192,16,51,76
61  1780 DATA 238,147,142,60,3,3
    2,249,154,169,0,141,252,3,14
    1,254,3,173,253
0A  1790 DATA 3,24,109,255,3,141
    ,253,3,32,138,139,172,60,3,1
    69,32,145,251
26  1800 DATA 200,192,80,240,3,7
    6,30,148,32,18,155,32,138,13

    9,173,10,192,201
6F  1810 DATA 1,240,35,104,141,5
    ,192,173,12,192,201,1,240,4,
    32,124,142,96
83  1820 DATA 173,4,192,56,237,5
    ,192,141,8,192,238,8,192,32,
    245,148,32,124
21  1830 DATA 142,96,104,141,5,1
    92,173,4,192,56,237,5,192,14
    1,8,192,32,254
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FB  1840 DATA 144,32,124,142,96,
    173,10,192,201,1,240,30,169,
    1,141,10,192,32
90  1850 DATA 94,139,169,67,141,
    41,4,162,0,189,95,137,201,42
    ,240,7,32,210
BE  1860 DATA 255,232,76,133,148
    ,96,169,0,141,10,192,169,32,
    141,41,4,32,94
F8  1870 DATA 139,162,0,189,111,
    137,201,42,240,7,32,210,255,
    232,76,163,148,96
A7  1880 DATA 173,12,192,201,1,2
    40,30,169,1,141,12,192,169,6
    5,141,42,4,32
59  1890 DATA 94,139,162,0,189,1
    90,137,201,42,240,7,32,210,2
    55,232,76,200,148
F0  1900 DATA 96,169,0,141,12,19
    2,169,32,141,42,4,32,94,139,
    162,0,189,203
72  1910 DATA 137,201,42,240,7,3
    2,210,255,232,76,230,148,96,
    32,249,154,169,0,141
54  1920 DATA 252,3,141,254,3,32
    ,138,139,173,8,192,201
43  1930 DATA 0,240,13,170,138,7
    2,32,40,145,104,170,202,224,
    0,208,244,32,18
26  1940 DATA 155,32,138,139,96,
    32,1,146,76,82,144,173,11
61  1950 DATA 192,201,100,240,24
    3,173,253,3,24,109,255,3,205
    ,11,192,16,231,173
3F  1960 DATA 11,192,72,32,249,1
    54,173,253,3,24,109,255,3,14
    1,60,3,206,60
92  1970 DATA 3,169,0,141,252,3,
    141,254,3,141,255,3,173,11,1
    92,141,253,3
14  1980 DATA 32,138,139,165,252
    ,133,254,165,251,24,105,80,1
    76,38,133,253,160,0
D7  1990 DATA 177,251,145,253,20
    0,192,79,208,247,206,11,192,
    173,11,192,205,60,3
2D  2000 DATA 208,201,32,18,155,
    104,141,11,192,238,11,192,32
    ,138,139,96,230,254
7F  2010 DATA 76,106,149,32,94,1
    39,162,0,189,217,137,201,42,
    240,7,32,210,255
22  2020 DATA 232,76,154,149,32,
    36,149,32,249,154,169,0,141,
    252,3,141,254,3
BC  2030 DATA 173,253,3,24,109,2
    55,3,141,253,3,32,138,139,16
    9,32,160,0,145
FB  2040 DATA 251,200,192,79,208
    ,249,32,18,155,32,138,139,16
    2,0,160,35,24,32
C6  2050 DATA 240,255,162,0,189,
    232,137,201,42,240,7,32,210,
    255,232,76,222,149
1B  2060 DATA 96,32,1,146,76,82,
    144,32,94,139,162,0,189,235,
    137,201,42,240
EA  2070 DATA 7,32,210,255,232,7
    6,248,149,173,253,3,24,109,2
    55,3,205,11,192
BA  2080 DATA 16,219,32,249,154,
    169,0,141,252,3,141,254,3,17
    3,253,3,24,109
80  2090 DATA 255,3,141,253,3,72
    ,32,138,139,104,141,60,3,173
    ,11,192,56,237
13  2100 DATA 60,3,170,165,252,1
    33,254,165,251,24,105,80,176
    ,46,133,253,160,0
BA  2110 DATA 177,253,145,251,20
    0,192,79,208,247,165,251,24,
    105,80,176,31,133,251
24  2120 DATA 165,253,24,105,80,
    176,27,133,253,202,224,0,208
    ,209,32,18,155,32
32  2130 DATA 138,139,32,212,149
    ,96,230,254,76,66,150,230,25
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    2,76,86,150,76,95
26  2140 DATA 150,173,253,3,72,1
    73,255,3,72,173,253,3,24,109
    ,255,3,141,253
F3  2150 DATA 3,169,0,141,255,3,
    141,254,3,141,252,3,32,138,1
    39,160,79,177
22  2160 DATA 251,201,32,208,8,1
    36,192,0,240,3,76,159,150,14
    0,13,192,104,141
02  2170 DATA 255,3,104,141,253,
    3,32,138,139,96,173,14,192,2
    01,1,240,30,169
DE  2180 DATA 1,141,14,192,169,7
    4,141,43,4,32,94,139,162,0,1
    89,128,137,201
FC  2190 DATA 42,240,7,32,210,25
    5,232,76,210,150,96,169,32,1
    41,43,4,169,0
A3  2200 DATA 141,14,192,32,94,1
    39,162,0,189,145,137,201,42,
    240,7,32,210,255
5B  2210 DATA 232,76,240,150,96,
    32,249,154,169,0,141,252,3,1
    41,254,3,173,253
13  2220 DATA 3,24,109,255,3,141
    ,253,3,32,138,139,172,4,192,
    177,251,201,32
C0  2230 DATA 240,7,32,18,155,32
    ,138,139,96,172,4,192,136,20
    4,3,192,48,247
1A  2240 DATA 177,251,201,32,240
    ,95,201,42,240,91,201,43,240
    ,87,201,44,240,83
4B  2250 DATA 201,45,240,79,201,
    46,240,75,201,58,240,71,201,
    59,240,67,201,60
D0  2260 DATA 240,63,201,61,240,
    59,201,62,240,55,201,63,240,
    51,201,92,240,47
73  2270 DATA 201,96,240,43,201,
    160,240,39,201,172,240,35,20
    1,174,240,31,201,187
3C  2280 DATA 240,27,201,175,240
    ,23,201,191,240,19,201,161,2
    40,15,201,164,240,11
BD  2290 DATA 201,165,240,7,201,
    166,240,3,76,42,151,140,252,
    3,140,60,3,169
39  2300 DATA 78,56,237,252,3,72
    ,32,138,139,104,168,177,251,
    200,145,251,136,136
F2  2310 DATA 192,0,16,245,160,0
    ,169,32,145,251,169,0,141,25
    2,3,32,138,139
31  2320 DATA 172,4,192,177,251,
    201,32,208,6,172,60,3,76,42,
    151,76,32,151
10  2330 DATA 169,1,141,16,192,1
    69,82,141,44,4,32,94,139,162
    ,0,189,249,137
A0  2340 DATA 201,42,240,7,32,21
    0,255,232,76,225,151,96,169,
    0,141,16,192,169
03  2350 DATA 32,141,44,4,32,94,
    139,162,0,189,4,138,201,42,2
    40,7,32,210
F1  2360 DATA 255,232,76,255,151
    ,96,32,94,139,162,0,189,34,1
    38,201,42,240,7
F2  2370 DATA 32,210,255,232,76,
    19,152,32,228,255,201,76,240
    ,12,201,83,240,11
F2  2380 DATA 201,13,240,3,76,33
    ,152,96,76,34,153,76,161,152
    ,169,147,32,210
3F  2390 DATA 255,169,142,32,210
    ,255,162,0,189,16,138,201,42
    ,240,7,32,210,255
33  2400 DATA 232,76,70,152,169,
    0,141,17,192,32,228,255,201,
    0,240,249,201,13
76  2410 DATA 240,49,201,20,240,
    23,174,17,192,157,48,192,232
    ,142,17,192,32,210
DD  2420 DATA 255,173,17,192,201
    ,10,240,25,76,89,152,174,17,
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    192,224,0,240,9
96  2430 DATA 32,210,255,206,17,
    192,76,89,152,32,1,146,76,89
    ,152,169,13,32
40  2440 DATA 210,255,32,210,255
    ,32,210,255,96,169,147,32,21
    0,255,32,58,152,169
DA  2450 DATA 0,133,43,169,160,1
    33,44,173,253,3,72,173,255,3
    ,72,174,11,192
01  2560 DATA 142,253,3,32,138,1
    39,165,251,133,45,165,252,13
    3,46,104,141,255,3
06  2570 DATA 104,141,253,3,162,
    1,160,1,169,1,32,186,255,173
    ,17,192,162,48
AE  2580 DATA 160,192,32,189,255
    ,166,251,164,252,169,43,32,2
    16,255,169,1,162,1
3B  2590 DATA 160,1,32,186,255,1
    69,0,32,189,255,169,0,133,43
    ,169,192,133,44
03  2600 DATA 169,100,133,45,169
    ,192,133,46,162,50,160,192,1
    69,43,32,216,255,167
52  2610 DATA 147,32,210,255,169
    ,14,32,210,255,76,213,138,16
    9,147,32,210,255,32
FF  2620 DATA 58,152,169,1,162,1
    ,160,0,32,186,255,173,17,192
    ,162,48,160,192
E2  2630 DATA 32,189,255,169,0,1
    62,0,160,160,32,213,255,169,
    1,162,1,160,0
0F  2640 DATA 32,186,255,169,0,3
    2,189,255,169,0,162,0,160,19
    2,32,213,255,169
C9  2650 DATA 14,32,210,255,76,2
    13,138,76,109,154,76,208,154
    ,32,94,139,162,0
56  2660 DATA 189,51,138,201,42,
    240,7,32,210,255,232,76,112,
    153,32,228,255,201
98  2670 DATA 0,240,249,169,0,32
    ,189,255,169,1,162,4,160,7,3
    2,186,255,32
29  2680 DATA 192,255,162,1,32,2
    01,255,169,13,32,168,255,169
    ,0,141,252,3,141
60  2690 DATA 253,3,141,254,3,14
    1,255,3,32,138,139,32,125,15
    0,173,13,192,201
04  2700 DATA 0,240,170,238,13,1
    92,160,0,177,251,141,60,3,14
    0,61,3,169,17
5A  2710 DATA 32,168,255,169,146
    ,32,168,255,173,60,3,172,61,
    3,201,32,240,103
43  2720 DATA 201,33,240,99,201,
    34,240,132,201,35,240,91,201
    ,36,240,87,201,37
99  2730 DATA 240,83,201,38,240,
    79,201,39,240,75,201,40,240,
    71,201,41,240,67
C1  2740 DATA 201,42,240,63,201,
    43,240,59,201,44,240,55,201,
    45,240,51,201,46
D5  2750 DATA 240,47,201,58,240,
    43,201,59,240,39,201,60,240,
    35,201,61,240,31
6A  2760 DATA 201,62,240,27,201,
    63,240,23,201,96,240,19,201,
    126,240,15,201,128
2E  2770 DATA 16,85,201,47,16,57
    ,201,33,16,70,24,105,64,140,
    61,3,32,168
05  2780 DATA 255,172,61,3,200,2
    04,13,192,208,24,192,79,208,
    23,238,253,3,173
48  2790 DATA 253,3,205,11,192,2
    08,6,32,231,255,76,213,138,7
    6,174,153,76,192
76  2800 DATA 153,169,13,32,168,
    255,76,86,154,201,58,48,202,
    201,65,16,3,76
50  2810 DATA 64,154,24,105,128,
    76,67,154,201,42,48,185,76,6
    4,154,73,128,201
E0  2820 DATA 34,240,20,140,61;3
    ,141,60,3,169,18,32,168,255,
    173,60,3,172
80  2830 DATA 61,3,76,216,153,14
    0,61,3,169,8,32,168,255,162,
    0,189,92,138
F9  2840 DATA 201,42,240,13,142,
    60,3,32,168,255,174,60,3,232
    ,76,177,154,169
12  2850 DATA 15,32,168,255,172,
    61,3,76,73,154,140,61,3,169,
    8,32,168,255
38  2860 DATA 162,0,189,85,138,2
    01,42,240,13,142,60,3,32,168
    ,255,174,60,3
D1  2870 DATA 232,76,218,154,169
    ,15,32,168,255,172,61,3,76,7
    3,154,173,252,3
C9  2880 DATA 141,248,192,173,25
    3,3,141,249,192,173,254,3,14
    1,250,192,173,255,3
17  2890 DATA 141,251,192,96,173
    ,248,192,141,252,3,173,249,1
    92,141,253,3,173,250
56  2900 DATA 192,141,254,3,173,
    251,192,141,255,3,96,32,193,
    140,32,49,140,76
38  2910 DATA 43,155,234,234,-1
FA  60000 REM CHECKSUM
6E  60010 :
6E  60020 IF CHECK<>572182 THEN
    PRINT "[CLR]DATA ERROR !!":P
    RINT"RE-CHECK DATA.":END
52  60030 :
60  60040 REM CHECK AMOUNT OF DA
    TA
46  60050 :
75  60060 IF REG<>39734 THEN PRI
    NT"[CLR]TOO MANY OR TOO LITT
    LE ! RE-CHECK DATA.":END
AA  60070 :
A9  60080 REM INFORM USER OF COR
    RECT COMPILATION
9E  60090 :
28  60100 PRINT"[CLR,DOWN7,RIGHT
    19]OK"
E7  60110 FOR PAUSE=0 TO 150:NEX
    T PAUSE
F8  60120 :
30  60130 REM ENTER THE WORD PRO
    CESSOR
EC  60140 :
37  60150 SYS 35050
34  63000 :
8D  63010 REM ******************
    *************
82  63020 REM ** THE DAZPRO WORD
     PROCESSOR **
32  63030 REM **          BASIC L
    OADER        **
6F  63040 REM ******************
    *************
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UDG Compactor

PROGRAM: COMPRESSOR

```
53  1 POKE53280,0:POKE53281,0:PR
    INTCHR$(8):POKE53272,20
9D  2 PRINT"[CLR,WHITE]HUMPTY SO
    FTWARE CHARACTER SET COMPRES
    SOR"
AA  3 PRINT"[DOWN2](C) AND WRITT
    EN HUMPTY DAMIEN MARSH 1988"
22  4 PRINT"FOR USE BY HUMPTY SO
    FTWARE PERSONAL ONLY"
D2  5 PRINT"[DOWN2]CHAR.SET SHOU
    LD ALREADY HAVE BEEN LOADED"
F5  6 PRINT"WHAT MEMORY POSITION
     DOES THE SET BEGIN?"
ED  7 GOSUB50:IFA<6000ORA>530000
    R(A>40000ANDA<49000)ORA/2048
    <>INT(A/2048)THEN7
CE  8 S=A:PRINT"LAST CHAR.IN SET
     IS CHAR.NO. (INCLUSIVE)"
C0  9 GOSUB50:IFA<2ORA>255THEN9
71  10 L=A:PRINT"SCANNING SET FO
    R DUPLICATES. PLEASE WAIT"
B3  11 DIMC(L),D(L),E(L):C(0)=25
    6:E=0:FORI=1TOL:FORJ=0TOI-1:
    F=0
3D  12 FORK=0TO7:IFPEEK(S+I*8+K)
    <>PEEK(S+J*8+K)THENF=1
DF  13 NEXT:ONFGOTO14:C(I)=J:J=I
    :GOTO15
70  14 C(I)=256:E=1
0E  15 NEXT:NEXT:IFE=0THENPRINT"
    SORRY, THERE'S NO DUPLICATES
     IN CHAR.SET":GOTO49
6B  16 PRINT"[DOWN2]SCAN COMPLET
    E. TABLE OF DUPLICATES READY
    "
6F  17 PRINT"PRINT TABLE OF DUPL
    ICATES ON THE SCREEN?"
06  18 GOSUB51:ON1-(A$="N")-(2*(
    A$="Y"))GOTO18,19:F=1:GOSUB5
    2
13  19 PRINT"[DOWN3]LIST TABLE O
    F DUPLICATES TO THE PRINTER?
    "
52  20 PRINT"IF 'Y' THEN ENSURE
    THAT PRINTER IS READY"
F7  21 GOSUB51:ON1-(A$="N")-(2*(
    A$="Y"))GOTO21,23:F=0:OPEN1,
    4:CMD1:GOSUB52
C5  22 PRINTCHR$(13)
AA  23 CLOSE1:OPEN3,3:CMD3:PRINT
    "[DOWN2]OPTIONS: (Q)UIT NOW,
    (D)ELETE DUPLICATES,"
6C  24 PRINT"[UP](C)OMPRESS CHAR
    SET. PRESS (Q),(D) OR (C)"
C4  25 GOSUB51:ON((A$="Q")*-1)+(
    (A$="D")*-2)+((A$="C")*-3)+1
    GOTO25,49,26,34
7F  26 PRINT"[DOWN3]NUMBER TO FI
    LL DELETED CHARACTERS WITH ?
    "
D1  27 GOSUB50:IFA<0ORA>255THEN2
    8
31  28 PRINT"FILLING DUPLICATES
    WITH THE ABOVE NUMBER"
B2  29 F=A:FORI=0TOL:IFC(I)<256T
    HENFORJ=0TO7:POKES+I*8+J,F:N
    EXT
34  30 NEXT:PRINT"COMPLETE. DUPL
    ICATES ARE NOW ALL DELETED"
96  31 FORI=0TOL:IFC(I)<256THEND
    (I)=C(I):GOTO33
A5  32 D(I)=I
BB  33 NEXT:GOTO43
79  34 PRINT"[DOWN3]REMOVING DUP
    LICATES AND COMPRESSING SET.
    ":Z=0:D(0)=0
AC  35 Z=Z+1:D(Z)=Z:IFC(Z)=256TH
    EN35
4E  36 J=Z:FORI=ZTOL:FORK=0TO7:P
    OKE14336+J*8+K,PEEK(14336+I*
    8+K):NEXT
A5  37 IFC(I)=256THEND(I)=J:J=J+
    1:GOTO39
30  38 D(I)=D(C(I))
26  39 NEXT:L1=J-1:PRINT"COMPLET
    E.  NUMBER TO FILL EXCESS CH
    ARS ?"
E4  40 GOSUB50:IFA<0ORA>255THEN4
    0
96  41 Z=A:FORI=S+L1*8TOS+2047:P
    OKEI,Z:NEXT
B8  42 PRINT"[DOWN]COMPLETE. THE
    RE ARE NOW"L1"CHARS USED."
B6  43 PRINT"[DOWN3]LIST OLD CHA
    RS/NEW CHARS TABLE TO SCREEN
    "
```

```
69  44 GOSUB51:ON1-(A$="N")-(2*(
    A$="Y"))GOTO44,45:F=1:GOSUB6
    0
3B  45 PRINT"[DOWN3]LIST OLD CHA
    R/NEW CHAR TABLE TO PRINTER?
    "
0F  46 GOSUB51:ON1-(A$="N")-(2*(
    A$="Y"))GOTO46,48:F=0:OPEN1,
    4:CMD1:GOSUB60
73  47 PRINTCHR$(13):CLOSE1:CLOS
    E3:OPEN3,3:CMD3
E7  48 PRINT"[DOWN3]I SUGGEST TH
    AT YOU SAVE YOUR NEW SET NOW
    "
8E  49 PRINT"[UP,C8]":END
79  50 GOSUB51:A=VAL(A$)-((A$="0
    ")/10):ON-(A=0)GOTO50:A=INT(
    A):RETURN
AB  51 POKE19,2:PRINT"[UP]>";:IN
    PUTA$:POKE19,0:PRINT:RETURN
A7  52 PRINT:GOSUB58
7B  53 FORI=0TOL:PRINTITAB(20):I
    FC(I)=256THENPRINT"*****":GO
    TO55
0A  54 PRINTC(I)
87  55 IFPEEK(214)=24ANDF=1THENW
    AIT198,1:POKE198,0:GOSUB58
5F  56 NEXT:IFF=1ANDPEEK(214)>17
    THENWAIT198,1:POKE198,0
B7  57 RETURN
B7  58 IFFTHENPRINT"[CLR]";
4E  59 PRINT"CHARACTER NUMBER"SP
    C(4)"IS IDENTICAL TO":PRINT:
    RETURN
BD  60 PRINT:GOSUB65
7F  61 FORI=0TOL:PRINTITAB(20)D(
    I)
26  62 IFPEEK(214)=24ANDF=1THENW
    AIT198,1:POKE198,0:GOSUB65
48  63 NEXT:IFF=1ANDPEEK(214)>19
    THENWAIT198,1:POKE198,0
CE  64 RETURN
62  65 IFFTHENPRINT"[CLR]";
91  66 PRINT"OLD CHARSET"SPC(9)"
    NEW CHARSET":PRINT:RETURN
```

William Tell

PROGRAM: WT4.BAS

```
8A  10 BL=472   :LN=50    :SA=3276
    8
F9  20 FOR L=0 TO BL:CX=0:FOR D=
    0 TO 15
BB  21 READ A:POKE53280,A
9E  22 CX=CX+A:POKE SA+L*16+D,A:
    NEXT
A2  30 READA:IF A=CX THEN40
12  31 PRINT"ERROR IN LINE";LN+(
    L*10):STOP
18  40 NEXT L:SYS40152
06  50 DATA 65,73,74,65,73,74,65
    ,66,68,32,39,32,40,32,66,65,
    929
73  60 DATA 66,66,66,65,65,65,65
    ,65,66,65,68,40,40,32,39,32,
    905
3A  70 DATA 65,66,65,65,66,66,65
    ,66,65,66,65,66,68,39,39,39,
    971
66  80 DATA 40,32,66,66,55,66,65
    ,66,66,65,66,65,66,65,68,39,
    966
72  90 DATA 40,32,32,39,65,66,66
    ,65,66,66,65,66,65,66,65,66,
    930
AE  100 DATA 68,40,39,32,39,32,6
    6,65,66,66,66,65,66,66,65,66
    ,907
11  110 DATA 65,66,68,40,32,39,3
    2,32,66,66,65,66,210,66,65,6
    5,1043
59  120 DATA 66,65,66,65,68,32,3
    9,32,39,32,65,65,66,66,65,65
    ,896
6D  130 DATA 66,66,66,66,65,66,6
    8,39,39,32,32,39,66,210,66,2
    10,1196
24  140 DATA 66,210,65,210,66,21
    0,66,210,68,40,32,40,32,32,2
    09,209,1765
6E  150 DATA 209,209,209,209,209
    ,209,209,209,209,209,68,39,4
    0,39,39,32,2347
F7  160 DATA 63,63,63,63,63,63,6
    3,63,63,63,63,63,67,40,39,32
    ,934
B1  170 DATA 32,39,64,64,64,64,6
    4,64,64,64,84,64,64,64,64,39
    ,962
00  180 DATA 39,39,32,32,65,66,6
    5,66,65,65,66,65,65,73,74,65
    ,942
24  190 DATA 66,40,40,40,39,39,9
    8,98,98,98,98,98,98,98,98,99
    ,1244
9D  200 DATA 98,98,98,39,32,40,3
    2,32,99,99,99,99,99,99,99,99
    ,1261
E3  210 DATA 99,99,99,99,99,39,4
    0,39,32,32,210,210,210,210,2
    10,210,1937
25  220 DATA 210,210,210,210,210
    ,210,210,39,39,32,32,39,208,
    208,208,208,2483
C4  230 DATA 208,208,208,208,208
    ,208,208,208,68,40,32,39,32,
    32,66,65,2038
29  240 DATA 66,65,66,65,210,66,
    210,66,65,66,68,39,40,32,32,
    32,1188
AA  250 DATA 65,66,65,66,65,66,6
    5,66,65,66,66,210,68,40,40,3
    9,1118
D6  260 DATA 39,32,66,65,66,65,6
    6,65,66,65,66,66,65,210,68,4
    0,1110
09  270 DATA 39,32,32,39,66,65,6
    6,66,65,66,65,66,66,210,66,6
    6,1075
60  280 DATA 68,32,32,39,39,32,6
    5,66,66,65,66,65,66,66,65,65
    ,897
07  290 DATA 66,65,68,39,39,32,3
    9,39,66,65,65,66,65,66,128,1
    27,1035
A7  300 DATA 127,66,65,66,68,40,
    32,32,32,32,65,66,65,66,65,6
    6,953
F4  310 DATA 65,65,66,66,66,65,6
    8,32,39,39,39,32,66,65,66,65
    ,904
F0  320 DATA 66,65,66,66,188,188
    ,188,188,68,40,32,40,32,32,6
    6,65,1390
C2  330 DATA 66,66,65,66,66,171,
    187,187,187,187,191,39,32,39
    ,32,39,1620
1A  340 DATA 65,66,65,66,123,125
    ,189,187,187,187,187,187,191
    ,32,40,32,1929
2F  350 DATA 39,32,66,65,66,65,1
    24,126,190,187,187,187,187,1
    87,191,39,1938
88  360 DATA 39,39,32,39,65,66,6
    5,66,65,66,65,170,187,187,18
    7,187,1525
88  370 DATA 191,39,32,40,39,32,
    66,65,66,66,66,65,66,66,65,6
    6,1030
4E  380 DATA 66,65,68,32,39,39,3
    2,32,65,66,65,66,65,66,65,65
    ,896
93  390 DATA 66,65,65,66,68,40,3
    9,40,32,39,65,65,65,65,65,65
    ,910
BF  400 DATA 65,65,65,66,65,66,6
    8,39,39,40,32,40,66,65,66,65
    ,912
28  410 DATA 66,66,128,127,127,6
    6,65,66,68,32,32,39,32,32,66
    ,66,1078
DB  420 DATA 65,66,66,55,66,65,6
    6,65,66,65,68,40,40,40,39,39
    ,921
14  430 DATA 65,66,65,66,65,66,6
    5,66,65,66,65,66,68,39,39,32
    ,964
63  440 DATA 32,32,66,65,66,65,6
    6,73,74,65,66,65,66,66,68,39
    ,974
C9  450 DATA 39,39,32,40,65,66,6
    5,66,66,65,65,65,66,65,65,66
    ,935
71  460 DATA 68,40,40,32,40,32,6
    5,65,66,66,65,66,65,66,65,66
    ,907
85  470 DATA 66,65,68,32,39,40,3
    2,39,66,66,65,65,66,66,66,65
    ,906
2E  480 DATA 66,66,65,66,68,39,3
    9,39,32,32,66,65,66,65,65,65
    ,904
A7  490 DATA 66,66,65,66,66,65,6
    8,40,39,39,32,40,65,66,65,66
    ,914
48  500 DATA 66,73,74,66,66,66,6
    5,66,68,32,39,32,40,32,66,65
    ,916
0A  510 DATA 66,66,66,65,65,65,6
    6,65,66,65,68,40,40,32,39,32
    ,906
E6  520 DATA 65,66,65,65,66,66,6
    5,66,65,66,65,66,68,39,39,39
    ,971
92  530 DATA 40,32,66,66,65,66,6
    5,66,66,65,66,65,66,65,68,39
    ,966
BE  540 DATA 40,32,32,39,65,66,6
    6,65,66,66,65,66,65,66,65,66
    ,930
78  550 DATA 68,40,39,32,39,32,6
    6,65,66,66,66,65,66,123,125,
    66,1024
20  560 DATA 65,66,68,40,32,39,3
    2,32,66,66,65,66,65,66,66,12
    4,958
C9  570 DATA 126,65,66,65,68,32,
    39,32,39,32,65,65,66,66,65,6
    5,956
B3  580 DATA 66,65,65,66,66,66,6
    8,39,39,32,32,39,66,65,66,65
    ,905
6B  590 DATA 66,66,65,66,66,66,6
    5,66,68,40,32,40,32,32,65,66
    ,901
B4  600 DATA 65,66,65,66,66,65,1
    88,188,188,188,68,39,40,39,3
    9,32,1402
F4  610 DATA 65,66,66,65,66,66,6
    5,70,89,89,89,89,191,40,39,3
    2,1187
CE  620 DATA 32,39,66,65,66,66,6
    5,65,66,128,128,128,128,128,
    191,39,1400
FE  630 DATA 39,39,32,32,66,66,6
    5,66,65,66,66,69,89,89,89,89
    ,1027
E4  640 DATA 191,40,40,40,39,39,
    65,66,65,66,66,66,65,65,66,6
    6,1045
10  650 DATA 66,66,68,39,32,40,3
    2,32,66,65,66,66,65,66,66,66
    ,901
78  660 DATA 65,66,65,66,68,39,4
    0,39,32,32,65,66,66,65,66,66
    ,906
C9  670 DATA 65,123,125,66,66,65
    ,68,39,39,32,32,39,66,66,65,
    66,1022
7B  680 DATA 66,66,66,124,126,65
    ,66,66,68,40,32,39,32,32,66,
    65,1019
```

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F4  690 DATA 66,65,66,65,66,65,6
    5,66,65,66,68,39,40,32,32,32
    ,898
94  700 DATA 65,66,65,66,65,66,6
    5,66,65,66,66,65,68,40,40,39
    ,973
A6  710 DATA 39,32,66,65,66,65,6
    6,65,66,65,66,66,65,66,68,40
    ,966
BD  720 DATA 39,32,32,39,66,65,6
    6,66,65,66,65,66,66,65,66,66
    ,930
5F  730 DATA 68,32,32,39,39,32,6
    5,66,66,65,66,65,66,66,65,65
    ,897
D2  740 DATA 66,65,68,39,39,32,3
    9,39,66,65,65,66,65,66,128,1
    27,1035
3A  750 DATA 127,66,65,66,68,40,
    32,32,32,32,65,66,65,66,65,6
    6,953
01  760 DATA 65,65,65,65,66,65,6
    8,32,39,39,39,32,66,65,66,65
    ,902
86  770 DATA 66,65,66,65,66,66,6
    5,66,68,40,32,40,32,32,66,65
    ,900
C6  780 DATA 66,66,65,66,65,66,6
    5,66,65,66,68,39,32,39,32,39
    ,905
02  790 DATA 65,66,65,66,66,65,6
    6,73,74,65,66,65,68,32,40,32
    ,974
BE  800 DATA 39,32,66,65,66,65,6
    6,65,66,65,65,66,65,66,68,39
    ,964
44  810 DATA 39,39,32,39,65,66,6
    5,66,65,66,65,66,66,65,66,66
    ,936
C1  820 DATA 68,39,32,40,39,32,6
    6,65,66,66,66,65,66,66,65,66
    ,907
52  830 DATA 66,65,68,32,39,39,3
    2,32,65,66,65,66,65,66,65,65
    ,896
7F  840 DATA 66,65,65,66,68,40,3
    9,40,32,39,65,65,65,65,65,65
    ,910
DB  850 DATA 65,65,65,66,65,66,6
    8,39,39,40,32,40,66,65,66,65
    ,912
8C  860 DATA 66,66,128,127,127,6
    6,65,66,68,32,32,39,32,32,66
    ,66,1078
EF  870 DATA 65,66,66,65,66,65,6
    6,65,66,65,68,40,40,40,39,39
    ,921
88  880 DATA 65,66,65,66,65,66,6
    5,66,65,66,65,66,68,39,39,32
    ,964
6F  890 DATA 32,32,66,65,66,65,6
    6,73,74,65,66,65,66,66,68,39
    ,974
E5  900 DATA 39,39,32,40,65,66,6
    5,66,66,65,65,65,66,65,65,66
    ,935
EB  910 DATA 68,40,40,32,40,32,6
    6,65,66,66,65,66,65,66,65,66
    ,908
49  920 DATA 66,65,68,32,39,40,3
    2,39,66,66,65,65,66,66,66,65
    ,906
E2  930 DATA 66,66,65,66,68,39,3
    9,39,32,32,66,65,66,65,66,65
    ,905
4B  940 DATA 66,66,65,66,66,65,6
    8,40,39,39,32,40,65,66,65,66
    ,914
B1  950 DATA 210,73,74,65,66,66,
    65,66,68,32,39,32,40,32,66,6
    5,1059
9C  960 DATA 66,66,210,65,65,66,
    66,65,66,65,68,40,40,32,39,3
    2,1051
53  970 DATA 65,66,65,65,210,66,
    65,66,65,66,65,66,68,39,39,3
    9,1115
61  980 DATA 40,32,66,66,65,66,6
    5,66,66,65,66,65,66,65,68,39
    ,966
23  990 DATA 40,32,32,39,65,66,6
    6,65,66,66,65,66,65,66,65,66
    ,930
47  1000 DATA 68,40,39,32,39,32,
    66,65,66,66,66,65,66,123,125
    ,66,1024
99  1010 DATA 65,66,68,40,32,39,
    32,32,66,66,65,66,65,66,66,1
    24,958
E7  1020 DATA 126,65,66,65,68,32
    ,39,32,39,32,65,210,66,66,65
    ,65,1101
A3  1030 DATA 66,65,66,66,65,66,
    68,39,39,32,32,39,66,210,66,
    210,1195
E8  1040 DATA 66,66,210,66,66,21
    0,66,210,68,40,32,40,32,32,2
    09,209,1622
06  1050 DATA 209,209,209,209,20
    9,209,209,209,209,209,68,39,
    40,39,39,32,2347
6F  1060 DATA 63,63,63,63,63,63,
    63,63,63,63,63,63,67,40,39,3
    2,934
39  1070 DATA 32,39,64,64,64.64.
    64,64,64,64,84,64,64,64,64,3
    9,962
05  1080 DATA 39,39,32,32,65,65,
    66,66,65,66,65,66,210,73,74,
    65,1088
EF  1090 DATA 65,40,40,40,39,39,
    71,71,71,65,66,65,66,66,210,
    65,1079
DC  1100 DATA 65,66,66,39,32,40,
    32,32,65,65,65,66,65,66,66,6
    6,896
45  1110 DATA 65,73,74,66,66,39,
    40,39,32,32,210,210,210,210,
    210,210,1786
D2  1120 DATA 210,210,210,210,21
    0,210,65,39,39,32,32,39,208,
    208,208,208,2338
3C  1130 DATA 208,208,208,208,20
    8,208,208,208,68,40,32,39,32
    ,32,66,65,2038
2A  1140 DATA 66,65,66,65,66,66,
    65,66,65,66,68,39,40,32,32,3
    2,899
F8  1150 DATA 65,66,65,66,65,66,
    65,66,65,66,66,65,68,40,40,3
    9,973
6E  1160 DATA 39,32,66,65,66,65,
    66,65,66,65,66,66,65,65,68,4
    0,965
11  1170 DATA 39,32,32,39,66,65,
    66,66,65,66,65,66,66,65,66,6
    6,930
E3  1180 DATA 68,32,32,39,39,32,
    65,66,66,65,66,65,66,66,65,6
    5,897
0E  1190 DATA 66,65,68,39,39,32,
    39,39,66,65,65,66,65,66,128,
    127,1035
6E  1200 DATA 127,66,65,66,68,40
    ,32,32,32,32,65,66,65,66,65,
    66,953
BD  1210 DATA 65,65,65,65,66,65,
    68,32,39,39,39,32,66,65,66,6
    5,902
2B  1220 DATA 66,65,66,65,66,66,
    65,66,68,40,32,40,32,32,66,6
    5,900
D1  1230 DATA 66,66,65,66,65,66,
    65,66,65,66,68,39,32,39,32,3
    9,905
96  1240 DATA 65,66,65,73,74,65,
    66,73,74,65,66,65,68,32,40,3
    2,989
6F  1250 DATA 39,32,66,65,66,65,
    65,65,66,65,65,66,65,66,68,3
    9,963
41  1260 DATA 39,39,32,39,65,66,
    65,66,65,66,65,66,66,65,66,6
    6,936
50  1270 DATA 68,39,32,40,39,32,
    66,65,66,66,66,65,66,66,65,6
    6,907
F6  1280 DATA 66,65,68,32,39,39,
    32,32,65,66,65,66,65,66,65,6
    5,896
7B  1290 DATA 66,65,65,66,68,40,
    39,40,32,39,65,65,65,65,65,6
    5,910
07  1300 DATA 65,65,65,66,65,66,
    68,39,39,40,32,40,66,65,66,6
    5,912
50  1310 DATA 66,66,128,127,127,
    66,65,66,68,32,32,39,32,32,6
    6,66,1078
43  1320 DATA 65,66,66,65,66,65,
    66,65,66,65,68,40,40,40,39,3
    9,921
3C  1330 DATA 65,66,65,66,65,66,
    65,66,65,66,65,66,68,39,39,3
    2,964
CB  1340 DATA 32,32,66,65,66,65,
    66,73,74,65,66,65,66,66,68,3
    9,974
71  1350 DATA 39,39,32,40,65,66,
    65,66,66,65,65,65,66,65,65,6
    6,935
E9  1360 DATA 68,40,40,32,40,32,
    65,65,66,66,65,66,65,66,65,6
    6,907
27  1370 DATA 66,65,68,32,39,40,
    32,39,66,66,65,210,66,66,66,
    65,1051
84  1380 DATA 66,66,65,66,68,39,
    39,39,32,32,66,65,66,65,65,6
    6,905
4F  1390 DATA 66,66,65,66,66,65,
    68,40,39,39,32,40,65,66,65,6
    6,914
94  1400 DATA 66,73,74,65,66,66,
    65,66,68,32,39,32,40,32,66,6
    5,915
72  1410 DATA 66,65,66,65,65,65,
    66,65,66,65,68,40,40,32,39,3
    2,905
71  1420 DATA 65,66,65,66,66,66,
    65,66,65,66,65,66,68,39,39,3
    9,972
AD  1430 DATA 40,32,66,66,65,66,
    65,66,66,65,66,65,66,65,68,3
    9,966
AF  1440 DATA 40,32,32,39,65,66,
    66,65,66,66,65,66,65,66,65,6
    6,930
0B  1450 DATA 68,40,39,32,39,32,
    66,65,66,66,66,65,66,123,125
    ,66,1024
CD  1460 DATA 65,66,68,40,32,39,
    32,32,66,66,65,66,65,66,66,1
    24,958
FF  1470 DATA 126,65,66,65,68,39
    ,39,32,39,32,65,65,66,66,65,
    65,963
B6  1480 DATA 66,65,66,66,65,66,
    68,39,39,32,32,39,66,65,66,6
    5,905
8C  1490 DATA 66,66,65,66,66,65,
    66,65,68,40,32,40,32,32,65,6
    6,900
5E  1500 DATA 65,66,65,66,66,65,
    65,66,65,66,68,39,40,39,39,3
    2,912
7D  1510 DATA 66,66,65,65,66,65,
    65,66,65,66,65,66,68,40,39,3
    2,965
53  1520 DATA 32,39,66,210,66,21
    0,66,210,66,210,66,210,66,21
    0,68,39,1834
39  1530 DATA 39,39,32,32,209,20
    9,209,209,209,209,209,209,20
    9,209,209,209,2650
C6  1540 DATA 68,40,40,40,39,39,
    63,63,63,63,63,63,63,63,63,6
    3,896
80  1550 DATA 63,63,67,39,39,40,
    32,32,63,63,63,63,63,63,63,6
    3,879
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D7   1560 DATA 222,221,221,221,22
     1,212,40,39,32,32,63,63,63,6
     3,63,63,1839
10   1570 DATA 63,63,223,100,100,
     100,100,220,212,32,32,39,63,
     63,63,63,1536
79   1580 DATA 63,63,63,63,166,16
     6,166,166,166,166,63,67,39,3
     2,66,66,1581
C0   1590 DATA 66,64,64,64,64,64,
     64,64,64,64,64,64,64,66,32,3
     2,964
5C   1600 DATA 65,66,65,65,65,66,
     65,66,65,66,165,165,66,65,66
     ,65,1246
5B   1610 DATA 39,32,66,65,73,74,
     66,65,73,74,66,128,127,127,6
     6,66,1207
A6   1620 DATA 66,66,32,39,66,66,
     65,65,65,66,65,65,66,65,65,6
     5,987
D7   1630 DATA 66,225,227,66,39,3
     2,65,66,73,74,66,65,73,74,65
     ,65,1341
07   1640 DATA 66,66,65,226,230,6
     5,39,39,66,65,65,65,65,66,65
     ,65,1318
38   1650 DATA 66,128,127,127,66,
     65,66,66,32,32,65,66,73,74,6
     5,66,1184
E4   1660 DATA 73,74,65,65,65,65,
     66,66,65,66,39,32,66,66,210,
     65,1148
73   1670 DATA 66,210,65,210,66,2
     10,66,66,210,66,66,210,32,32
     ,210,210,1995
0B   1680 DATA 210,210,210,210,21
     0,210,210,210,210,210,210,21
     0,210,210,39,39,3018
1A   1690 DATA 63,63,63,63,63,63,
     63,63,63,63,63,63,63,63,63,6
     3,1008
09   1700 DATA 224,32,63,63,63,63
     ,63,63,63,63,63,63,63,63,63,
     63,1138
ED   1710 DATA 63,63,63,224,63,63
     ,63,63,63,63,63,63,63,63,63,
     63,1169
83   1720 DATA 63,63,63,63,63,63,
     64,64,64,64,64,64,64,64,64,6
     4,1018
CB   1730 DATA 64,64,64,64,64,64,
     64,66,65,66,65,66,65,66,65,6
     5,1037
F0   1740 DATA 66,65,65,66,65,65,
     66,65,66,65,67,77,80,32,35,5
     7,1002
3D   1750 DATA 0,116,103,188,72,6
     6,69,81,32,83,69,84,50,0,127
     ,103,1243
96   1760 DATA 198,72,67,77,80,32
     ,35,52,0,140,103,208,72,66,6
     9,81,1352
D0   1770 DATA 32,83,0,0,0,0,0,0,
     0,0,169,6,141,35,208,169,843
6C   1780 DATA 1,141,34,208,173,2
     2,208,9,16,141,22,208,96,169
     ,24,133,1605
A2   1790 DATA 253,169,5,133,254,
     169,25,133,251,169,5,133,252
     ,169,36,133,2289
D5   1800 DATA 20,162,18,134,21,2
     02,160,38,177,253,145,251,13
     6,16,249,200,2182
D7   1810 DATA 173,122,3,133,2,17
     3,123,3,133,3,177,2,145,253,
     24,165,1634
23   1820 DATA 253,105,40,133,253
     ,144,3,230,254,24,165,251,10
     5,40,133,251,2384
E6   1830 DATA 144,2,230,252,238,
     122,3,208,3,238,123,3,202,16
     ,199,56,2039
DC   1840 DATA 173,122,3,229,20,1
     41,122,3,176,4,206,123,3,56,
     173,124,1678
63   1850 DATA 3,229,21,141,124,3
     ,176,3,206,125,3,238,167,2,9
     6,169,1706
74   1860 DATA 24,133,253,169,5,1
     33,254,169,23,133,251,169,5,
     133,252,162,2268
CA   1870 DATA 18,134,20,202,160,
     1,177,253,145,251,200,192,40
     ,144,247,173,2357
01   1880 DATA 124,3,133,2,173,12
     5,3,133,3,177,2,136,145,253,
     169,39,1620
43   1890 DATA 101,253,133,253,14
     4,3,230,254,24,169,40,101,25
     1,133,251,144,2484
0C   1900 DATA 2,230,252,238,124,
     3,208,3,238,125,3,202,16,198
     ,24,173,2039
F9   1910 DATA 122,3,101,20,141,1
     22,3,144,3,238,123,3,206,167
     ,2,96,1494
EF   1920 DATA 169,192,141,52,3,1
     69,176,141,53,3,96,206,193,2
     ,208,250,2054
7F   1930 DATA 162,1,189,52,3,233
     ,8,157,52,3,202,16,245,32,24
     8,108,1711
85   1940 DATA 32,35,106,173,184,
     2,73,3,141,184,2,141,248,7,1
     69,5,1505
64   1950 DATA 141,193,2,206,172,
     2,169,24,133,251,169,5,133,2
     52,169,64,2085
F6   1960 DATA 133,253,169,5,133,
     254,173,170,2,141,126,3,173,
     171,2,141,2049
D7   1970 DATA 127,3,162,17,160,3
     9,177,253,145,251,136,16,249
     ,24,165,253,2177
EF   1980 DATA 105,40,133,253,144
     ,3,230,254,24,165,251,105,40
     ,133,251,144,2275
10   1990 DATA 2,230,252,202,208,
     222,160,0,173,126,3,133,2,17
     3,127,3,2016
AE   2000 DATA 133,3,177,2,157,19
     2,7,232,224,40,176,15,173,12
     6,3,105,1765
D1   2010 DATA 18,141,126,3,144,2
     26,238,127,3,176,221,238,170
     ,2,208,3,2044
9F   2020 DATA 238,171,2,238,185,
     2,208,3,238,186,2,172,172,2,
     240,5,2064
E4   2030 DATA 192,18,240,34,96,1
     62,14,142,122,3,162,92,142,1
     23,3,162,1707
FD   2040 DATA 200,142,124,3,162,
     94,142,125,3,160,63,140,185,
     2,160,75,1780
E4   2050 DATA 140,186,2,76,118,1
     04,162,24,142,124,3,162,75,1
     42,125,3,1588
0E   2060 DATA 162,94,142,122,3,1
     62,72,142,123,3,160,32,140,1
     70,2,160,1689
57   2070 DATA 92,140,171,2,76,11
     8,104,172,172,2,192,18,240,2
     46,206,193,2144
BF   2080 DATA 2,208,177,162,1,18
     9,52,3,105,8,157,52,3,202,16
     ,245,1582
85   2090 DATA 173,184,2,73,3,141
     ,184,2,141,248,7,169,5,141,1
     93,2,1668
C4   2100 DATA 32,248,108,32,90,1
     06,238,172,2,169,192,133,251
     ,169,7,133,2082
48   2110 DATA 252,169,152,133,25
     3,169,7,133,254,173,185,2,14
     1,128,3,173,2327
64   2120 DATA 186,2,141,129,3,16
     2,17,160,39,177,253,145,251,
     136,16,249,2066
10   2130 DATA 56,165,253,233,40,
     133,253,176,3,198,254,56,165
     ,251,233,40,2509
26   2140 DATA 133,251,176,2,198,
     252,202,208,222,162,39,160,0
     ,173,128,3,2309
6F   2150 DATA 133,2,173,129,3,13
     3,3,177,2,157,24,5,202,48,16
     ,56,1263
7F   2160 DATA 173,128,3,233,18,1
     41,128,3,176,227,206,129,3,1
     44,222,206,2140
F2   2170 DATA 185,2,208,3,206,18
     6,2,206,170,2,208,3,206,171,
     2,76,1836
CD   2180 DATA 33,105,162,79,169,
     8,157,24,217,202,16,250,96,1
     73,172,2,1865
6A   2190 DATA 201,7,144,238,173,
     181,2,133,251,173,182,2,133,
     252,169,10,2251
CB   2200 DATA 160,39,145,251,136
     ,16,251,169,8,160,119,145,25
     1,136,192,79,2257
CA   2210 DATA 208,249,56,165,251
     ,233,40,141,181,2,176,2,198,
     252,165,252,2571
0B   2220 DATA 141,182,2,96,173,1
     72,2,201,6,144,248,24,173,18
     1,2,105,1852
CC   2230 DATA 40,141,181,2,133,2
     51,144,3,238,182,2,173,182,2
     ,133,252,2059
CA   2240 DATA 169,10,160,119,145
     ,251,136,192,79,16,249,169,8
     ,160,39,145,2047
4E   2250 DATA 251,136,16,251,96,
     173,25,208,141,25,208,41,1,2
     40,73,173,2058
26   2260 DATA 17,208,41,127,141,
     17,208,173,188,2,240,3,76,15
     0,109,174,1874
8D   2270 DATA 187,2,142,22,208,1
     69,50,141,18,208,206,188,2,1
     73,221,2,1939
52   2280 DATA 240,6,32,63,118,76
     ,49,234,169,5,141,33,208,173
     ,205,2,1754
F6   2290 DATA 240,6,32,12,109,76
     ,214,106,173,204,2,240,3,32,
     69,109,1627
63   2300 DATA 173,96,3,240,6,32,
     71,112,76,49,234,173,0,220,4
     1,15,1541
26   2310 DATA 73,15,133,255,174,
     167,2,172,172,2,240,7,192,18
     ,240,3,1865
ED   2320 DATA 76,54,108,172,196,
     2,208,60,165,255,208,56,224,
     120,208,42,2154
10   2330 DATA 141,197,2,173,235,
     2,141,248,7,206,236,2,208,20
     2,173,213,2386
D3   2340 DATA 2,73,1,141,213,2,2
     08,3,32,248,108,169,10,141,2
     36,2,1589
56   2350 DATA 173,235,2,73,24,14
     1,235,2,208,174,173,248,7,20
     1,198,144,2238
BA   2360 DATA 7,76,189,107,224,2
     40,144,12,160,0,140,197,2,16
     0,193,140,1991
91   2370 DATA 248,7,208,110,201,
     4,240,8,201,6,240,4,201,5,20
     8,98,1989
20   2380 DATA 238,187,2,173,187,
     2,41,8,240,8,32,163,103,169,
     16,141,1710
9E   2390 DATA 187,2,173,196,2,24
     0,3,76,137,108,206,237,2,208
     ,64,169,2010
B2   2400 DATA 3,141,237,2,206,24
     6,2,208,3,32,243,108,173,135
     ,3,201,1943
23   2410 DATA 194,144,10,233,1,1
     41,248,7,141,135,3,208,9,169
     ,0,141,1784
C8   2420 DATA 197,2,169,196,208,
     239,173,66,3,208,20,173,247,
     2,208,15,2126
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5B 2430 DATA 173,0,220,41,16,208,8,160,207,140,248,7,32,12,109,76,1657
2D 2440 DATA 54,108,174,167,2,208,12,169,0,141,197,2,169,203,141,248,1995
2C 2450 DATA 7,208,236,201,8,240,8,201,9,240,4,201,10,208,97,173,2051
59 2460 DATA 187,2,41,7,208,10,32,21,104,169,23,141,187,2,208,3,1345
C4 2470 DATA 206,187,2,173,196,2,240,3,76,137,108,206,237,2,208,64,2047
6B 2480 DATA 169,3,141,237,2,206,246,2,208,3,32,243,108,173,136,3,1912
26 2490 DATA 201,203,176,10,105,1,141,248,7,141,136,3,208,9,169,0,1758
88 2500 DATA 141,197,2,169,200,208,239,173,66,3,208,20,173,247,2,208,2256
74 2510 DATA 15,173,0,220,41,16,208,8,160,208,140,248,7,32,69,109,1654
AC 2520 DATA 173,196,2,208,78,165,255,174,167,2,224,120,208,9,201,1,2183
5C 2530 DATA 208,17,32,109,105,208,96,201,5,240,11,201,9,240,7,201,1890
1D 2540 DATA 1,240,3,76,220,108,172,197,2,208,76,140,4,212,160,17,1836
B9 2550 DATA 140,196,2,140,4,212,160,6,140,6,212,160,26,140,5,212,1761
CD 2560 DATA 173,248,7,201,198,176,7,169,192,141,248,7,208,10,169,204,2358
E1 2570 DATA 141,248,7,173,195,2,208,34,206,1,208,173,194,2,10,141,1943
17 2580 DATA 1,212,206,194,2,208,16,238,195,2,169,47,133,251,169,6,2049
42 2590 DATA 133,252,162,0,32,253,119,76,49,234,238,1,208,173,216,2,2148
08 2600 DATA 208,7,173,194,2,10,141,1,212,238,194,2,173,194,2,201,1952
B5 2610 DATA 28,208,228,141,197,2,169,0,141,216,2,141,195,2,141,196,2007
26 2620 DATA 2,141,4,212,240,209,174,167,2,224,120,208,202,165,255,201,2526
C5 2630 DATA 2,208,196,172,172,2,240,191,32,129,104,208,186,169,4,141,2156
B0 2640 DATA 246,2,169,0,141,4,212,141,5,212,141,6,212,169,129,141,1930
25 2650 DATA 4,212,141,1,212,96,162,2,173,52,3,141,3,208,173,66,1649
4A 2660 DATA 3,208,20,32,118,111,169,172,141,2,208,141,205,2,169,197,1898
F0 2670 DATA 141,249,7,141,206,2,96,32,230,119,56,173,2,208,233,5,1900
CB 2680 DATA 141,2,208,201,30,176,206,169,0,141,205,2,76,18,112,162,1849
D0 2690 DATA 2,173,52,3,141,3,208,173,66,3,208,20,32,118,111,169,1482
49 2700 DATA 224,141,2,208,141,204,2,169,199,141,249,7,141,206,2,96,2132
31 2710 DATA 32,230,119,24,169,5,172,82,3,208,22,109,2,208,144,13,1542
7F 2720 DATA 168,173,16,208,9,2,141,16,208,141,82,3,152,141,2,208,1670
42 2730 DATA 96,109,2,208,201,60,144,245,169,0,141,204,2,76,18,112,1787
51 2740 DATA 174,189,2,142,22,208,238,188,2,169,7,172,112,3,240,10,1878
46 2750 DATA 169,6,141,76,216,141,77,216,169,15,141,33,208,160,106,174,2048
E1 2760 DATA 221,2,208,7,173,172,2,201,18,240,2,136,136,140,18,208,1884
02 2770 DATA 224,0,208,34,160,1,185,236,4,201,48,208,20,136,16,246,1927
1B 2780 DATA 238,236,216,173,236,216,41,7,141,236,216,141,237,216,141,238,2929
0A 2790 DATA 216,173,198,2,240,33,169,100,162,1,157,98,4,157,102,4,1816
96 2800 DATA 157,140,4,157,60,4,202,16,241,173,221,2,208,3,76,8,1672
D0 2810 DATA 111,32,144,103,76,233,110,173,224,2,240,17,56,233,9,141,1904
6B 2820 DATA 224,2,141,8,212,41,7,141,76,216,141,77,216,173,215,2,1892
9B 2830 DATA 208,5,173,172,2,208,6,32,141,114,24,144,28,173,68,3,1501
CE 2840 DATA 208,16,206,210,2,208,18,173,133,3,73,5,141,250,7,141,1794
72 2850 DATA 133,3,160,1,162,4,32,80,111,162,6,173,102,3,240,5,1377
DC 2860 DATA 32,232,112,144,4,168,32,80,111,173,72,3,208,5,206,211,1793
DD 2870 DATA 2,208,16,162,8,173,104,3,240,5,32,232,112,144,4,168,1613
3C 2880 DATA 32,80,111,173,74,3,208,5,206,212,2,208,16,162,10,173,1675
6C 2890 DATA 106,3,240,5,32,232,112,144,4,168,32,3,113,162,12,173,1541
C8 2900 DATA 108,3,240,5,32,232,112,144,4,168,32,3,113,173,172,2,1543
E5 2910 DATA 240,65,173,215,2,208,60,173,78,3,208,48,173,68,3,240,1957
1F 2920 DATA 50,173,134,3,73,31,141,134,3,141,255,7,201,197,208,15,1766
D8 2930 DATA 173,28,208,9,128,141,28,208,169,7,141,46,208,208,13,173,1888
FE 2940 DATA 28,208,41,127,141,28,208,169,0,141,46,208,160,1,162,14,1682
FE 2950 DATA 32,3,113,206,190,2,208,26,169,4,141,190,2,162,7,189,1644
5C 2960 DATA 16,61,168,202,189,16,61,157,17,61,224,0,208,245,152,157,1934
2A 2970 DATA 16,61,173,172,2,240,61,206,183,2,208,56,162,6,142,183,1873
58 2980 DATA 2,232,189,56,63,72,189,64,63,157,56,63,104,157,64,63,1594
3D 2990 DATA 24,189,104,58,42,144,2,105,0,42,144,2,105,0,157,104,1222
AF 3000 DATA 58,189,112,58,42,144,2,105,0,42,144,2,105,0,157,112,1272
DD 3010 DATA 58,202,16,206,32,93,121,76,129,234,185,52,3,201,90,176,1874
96 3020 DATA 3,76,16,112,201,247,176,249,157,1,208,189,64,3,208,42,1952
7D 3030 DATA 173,167,2,201,218,176,34,201,120,240,30,169,0,157,0,208,2096
86 3040 DATA 157,80,3,189,56,112,168,73,255,45,16,208,141,16,208,152,1879
CE 3050 DATA 13,21,208,141,21,208,157,64,3,96,32,230,119,189,41,112,1655
5F 3060 DATA 168,173,203,2,208,27,173,167,2,240,22,173,172,2,240,4,1976
64 3070 DATA 201,18,208,13,165,255,240,9,201,3,144,5,201,7,144,3,1817
9E 3080 DATA 136,136,24,189,80,3,208,26,152,125,0,208,144,15,168,173,1787
D1 3090 DATA 16,208,29,56,112,141,16,208,157,80,3,152,24,157,0,208,1567
D4 3100 DATA 144,11,152,125,0,208,201,75,176,48,157,0,208,224,4,240,1973
D6 3110 DATA 40,189,224,2,168,170,56,185,55,3,233,1,153,55,3,208,1745
15 3120 DATA 24,138,153,55,3,56,185,51,3,233,1,16,2,169,3,153,1245
26 3130 DATA 51,3,168,185,242,2,157,248,7,96,169,0,157,64,3,157,1709
7A 3140 DATA 96,3,189,56,112,73,255,168,45,16,208,141,16,208,152,45,1783
7F 3150 DATA 21,208,141,21,208,24,96,4,0,2,0,3,0,3,0,2,733
3D 3160 DATA 0,4,1,0,2,0,4,0,8,0,16,0,32,0,64,0,131
90 3170 DATA 128,173,203,2,208,31,169,32,141,4,212,24,173,1,208,105,1814
F1 3180 DATA 1,141,1,208,144,4,238,203,2,96,73,255,141,1,212,169,1889
05 3190 DATA 33,141,4,212,96,173,198,2,208,20,173,234,2,240,3,76,1815
FB 3200 DATA 123,117,169,254,45,21,208,141,21,208,238,198,2,96,173,167,2181
81 3210 DATA 2,201,120,240,35,169,16,141,4,212,169,17,141,4,212,173,1856
03 3220 DATA 167,2,144,11,73,255,141,1,212,32,192,120,76,21,104,141,1692
BC 3230 DATA 1,212,32,16,121,76,163,103,173,172,2,201,18,240,21,10,1561
CE 3240 DATA 141,1,212,169,0,141,21,208,160,16,140,4,212,200,140,4,1769
AA 3250 DATA 212,76,153,105,173,202,2,208,3,76,207,113,32,0,134,169,1865
48 3260 DATA 193,141,52,3,169,177,141,53,3,169,28,141,194,2,173,30,1669
4B 3270 DATA 208,96,24,189,1,208,105,3,144,15,224,4,208,8,173,208,1818
53 3280 DATA 2,73,1,141,208,2,76,16,112,157,1,208,96,185,52,3,1333
76 3290 DATA 201,90,176,3,76,16,112,201,247,176,249,157,1,208,189,64,2166
E7 3300 DATA 3,208,40,173,167,2
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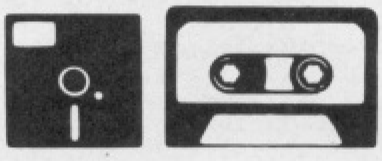
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   ,201,16,144,32,201,120,240,2
   8,189,56,1820
1D 3310 DATA 112,168,13,16,208,
   141,16,208,152,13,21,208,141
   ,21,208,157,1803
72 3320 DATA 64,3,157,80,3,169,
   75,157,0,208,96,189,41,112,1
   68,173,1695
B2 3330 DATA 203,2,208,29,173,1
   67,2,201,240,240,22,173,172,
   2,240,4,2078
F6 3340 DATA 201,18,208,13,165,
   255,240,9,201,3,144,5,201,7,
   176,3,1849
BA 3350 DATA 136,136,56,140,233
   ,2,189,80,3,240,35,189,0,208
   ,237,233,2117
EA 3360 DATA 2,176,19,168,189,5
   6,112,73,255,45,16,208,141,1
   6,208,169,1853
52 3370 DATA 0,157,80,3,152,56,
   157,0,208,176,17,76,16,112,1
   89,0,1399
AC 3380 DATA 208,237,233,2,144,
   245,157,0,208,32.230,119,224
   ,14,240,40,2333
0F 3390 DATA 189,220,2,168,170,
   56,185,57,3,233,1,153,57,3,2
   08,24,1729
D6 3400 DATA 138,153,57,3,56,18
   5,53,3,233,1,16,2,169,3,153,
   53,1278
40 3410 DATA 3,168,185,238,2,15
   7,250,7,96,173,201,2,208,40,
   169,1,1900
08 3420 DATA 141,21,208,141,27,
   208,169,255,141,0,208,141,20
   1,2,169,0,2032
21 3430 DATA 141,4,212,169,15,1
   41,5,212,141,6,212,169,17,14
   1,4,212,1801
5C 3440 DATA 169,192,141,1,208,
   96,173,199,2,208,31,173,1,20
   8,168,73,2043
3E 3450 DATA 255,141,1,212,152,
   56,233,1,201,158,208,230,169
   ,192,141,248,2598
8E 3460 DATA 7,141,199.2,169,0,
   141,27,208,96,173,200,2,208,
   21,173,1767
E6 3470 DATA 1,208,168,73,255,1
   41,1,212,152,24,105,1,201,19
   3,208,194,2137
B6 3480 DATA 141,200,2,96,56,17
   3,0,208,233,1,201,197,240,41
   ,141,0,1930
63 3490 DATA 208,206,237,2,208,
   237,169,3,141,237,2,206,246,
   2,208,3,2315
9B 3500 DATA 32,243,108,173,135
   ,3,201,194,144,9,233,1,141,2
   48,7,141,2013
3B 3510 DATA 135,3,96,169,196,2
   08,245,169,198,141,248,7,141
   ,202,2,169,2329
94 3520 DATA 0,141,4,212,169,6,
   141,5,212,141,6,212,169,150,
   141,1,1710
0E 3530 DATA 212,169,17,141,4,2
   12,96,173,214,2,240,6,32,171
   ,115,76,1880
05 3540 DATA 160,114,173,217,2,
   240,3,32,3,117,162,4,173,100
   ,3,240,1743
6A 3550 DATA 3,76,232,112,173,5
   2,3,201,90,176,3,76,155,115,
   201,247,1915
10 3560 DATA 176,249,141,5,208,
   173,208,2,208,3,76,45,116,17
   3,68,3,1854
17 3570 DATA 208,52,173,167,2,2
   01,220,144,6,169,0,141,208,2
   ,96,201,1990
A5 3580 DATA 120,240,34,206,210
   ,2,208,29,169,12,141,169,2,1
   41,215,2,1900
95 3590 DATA 173,28,208,41,127,
   141,28,208,169,169,141,250,7
   ,169,0,141,2000
72 3600 DATA 41,208,32,113,111,
   96,32,230,119,173,113,3,73,1
   ,141,113,1599
1E 3610 DATA 3,168,173,203,2,20
   8,27,173,167,2,240,22,173,17
   2,2,240,1975
BD 3620 DATA 4,201,18,208,13,16
   5,255,240,9,201,3,144,5,201,
   7,144,1818
94 3630 DATA 3,136,136,24,173,8
   4,3,208,41,152,109,4,208,144
   ,13,168,1606
47 3640 DATA 173,16,208,9,4,141
   ,84,3,141,16,208,152,141,4,2
   08,172,1680
C8 3650 DATA 214,2,208,25,201,4
   0,208,21,141,214,2,169,165,1
   41,250,7,2008
57 3660 DATA 208,11,152,109,4,2
   08,201,85,176,59,141,4,208,2
   06,132,3,1907
5B 3670 DATA 208,30,169,3,141,1
   32,3,56,173,214,2,240,5,173,
   169,2,1720
4D 3680 DATA 208,15,173,250,7,2
   33,1,201,165,208,2,169,169,1
   41,250,7,2199
BC 3690 DATA 96,173,250,7,233,1
   ,201,161,208,2,169,165,141,2
   50,7,206,2270
F0 3700 DATA 169,2,240,231,96,1
   73,208,2,73,1,141,208,2,169,
   0,141,1856
76 3710 DATA 215,2,76,18,112,16
   2,14,173,52,3,201,247,176,10
   1,141,15,1708
37 3720 DATA 208,173,78,3,208,2
   2,169,170,141,255,7,141,214,
   2,173,4,1968
AF 3730 DATA 208,141,14,208,169
   ,0,141,46,208,76,118,111,32,
   230,119,160,1981
94 3740 DATA 4,173,203,2,208,27
   ,173,167,2,240,22,173,172,2,
   240,4,1812
83 3750 DATA 201,18,208,13,165,
   255,240,9,201,3,144,5,201,7,
   144,3,1817
61 3760 DATA 136,136,24,152,109
   ,14,208,172,94,3,208,19,144,
   13,168,173,1773
79 3770 DATA 16,208,9,128,141,1
   6,208,141,94,3,152,141,14,20
   8,96,201,1776
8F 3780 DATA 78,144,248,169,0,1
   41,217,2,141,214,2,157,64,3,
   173,21,1774
40 3790 DATA 208,41,127,141,21,
   208,96,173,68,3,208,49,173,1
   67,2,201,1886
45 3800 DATA 16,176,6,169,1,141
   ,208,2,96,201,120,208,3,76,1
   55,115,1693
C2 3810 DATA 206,210,2,208,225,
   173,28,208,41,127,141,28,208
   ,169,12,141,2127
4B 3820 DATA 169,2,141,215,2,16
   9,154,141,250,7,76,36,113,17
   3,113,3,1764
63 3830 DATA 73,1,141,113,3,168
   ,173,203,2,208,29,173,167,2,
   201,240,1897
0B 3840 DATA 240,22,173,172,2,2
   40,4,201,18,208,13,165,255,2
   40,9,201,2163
6B 3850 DATA 3,144,5,201,7,176,
   3,136,136,56,140,233,2,173,4
   ,208,1627
07 3860 DATA 237,233,2,172,84,3
   ,240,34,176,15,168,169,251,4
   5,16,208,2053
C4 3870 DATA 141,16,208,169,0,1
   41,84,3,152,141,4,208,201,40
   ,208,21,1737
AD 3880 DATA 141.217,2,169,158,
   141,250,7,208,11,176,3,76,15
   5,115,141,1970
1B 3890 DATA 4,208,32,230,119,2
   06,132,3,208,30,169,3,141,13
   2,3,24,1644
ED 3900 DATA 173,217,2,240,5,17
   3,169,2,208,15,173,250,7,105
   ,1,201,1941
ED 3910 DATA 158,208,2,169,154,
   141,250,7,96,173,250,7,105,1
   ,201,162,2084
08 3920 DATA 208,2,169,158,141,
   250,7,206,169,2,240,231,96,1
   62,14,173,2228
08 3930 DATA 52,3,201,247,144,3
   ,76,25,116,141,15,208,173,78
   ,3,208,1693
70 3940 DATA 20,169,171,141,255
   ,7,169,0,141,46,208,32,36,11
   3,173,4,1685
4C 3950 DATA 208,141,14,208,96,
   32,230,119,160,4,173,203,2,2
   08,29,173,2000
F6 3960 DATA 167,2,201,240,240,
   22,173,172,2,240,4,201,18,20
   8,13,165,2068
FD 3970 DATA 255,240,9,201,3,14
   4,5,201,7,176,3,136,136,56,1
   40,233,1945
B9 3980 DATA 2,173,14,208,237,2
   33,2,172,94,3,240,21,176,15,
   168,169,1927
3A 3990 DATA 127,45,16,208,141,
   16,208,169,0,141,94,3,152,14
   1,14,208,1683
F7 4000 DATA 96,176,250,144,145
   ,172,218,2,208,70,140,114,3,
   140,251,3,2132
1F 4010 DATA 200,140,252,3,56,1
   85,156,4,249,251,3,201,48,17
   6,2,105,2031
6B 4020 DATA 10,153,156,4,136,1
   6,238,200,185,157,4,201,48,2
   08,11,185,1912
85 4030 DATA 156,4,201,48,208,4
   ,141,221,2,96,160,10,140,5,2
   12,200,1808
8F 4040 DATA 140,12,212,160,6,1
   40,6,212,136,140,13,212,140,
   218,2,96,1845
64 4050 DATA 173,114,3,208,51,1
   69,33,141,4,212,169,17,141,1
   1,212,172,1830
0A 4060 DATA 219,2,185,52,118,1
   41,114,3,185,19,118,141,1,21
   2,185,30,1725
64 4070 DATA 118,141,8,212,185,
   41,118,141,0,212,200,192,12,
   208,5,160,1953
35 4080 DATA 0,140,234,2,140,21
   9,2,96,206,114,3,173,114,3,2
   01,4,1651
E5 4090 DATA 208,10,169,32,141,
   4,212,169,16,141,11,212,96,6
   ,6,6,1439
5D 4100 DATA 6,8,7,7,6,6,5,5,6,10
   ,10,10,10,12,11,11,10,135
77 4110 DATA 10.9,10,200,200,20
   0,200,10,200,200,200.200,250
   ,200,26,24,2139
DA 4120 DATA 11,22,19,11,13,13,
   12,11,25,173,19,3,208,114,17
   3,220,1047
C6 4130 DATA 2,208,22,141,21,20
   8,173,137,3,41,162,73,130,9,
   32,141,1503
A0 4140 DATA 137,3,169,254,133,
   255,141,220,2,173,222,2,240,
   3,76,72,2102
47 4150 DATA 119,141,33,208,165
   ,255,170,41,5,141,1,212,141,
   3,212,138,1985
61 4160 DATA 10,141,15,212,73,3
   7,141,8,212,169,128,141,18,2
   12,141,11,1669
A1 4170 DATA 212,169,64,141,4,2
   12,169,6,141,5,212,141,6,212
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   ,141,12,1847
F9 4180 DATA 212,141,13,212,141
   ,19,212,141,20,212,169,129,1
   41,11,212,141,2126
D0 4190 DATA 18,212,169,65,141,
   4,212,232,232,224,80,208,4,1
   42,222,2,2167
F6 4200 DATA 96,134,255,189,248
   ,118,133,251,133,253,189,249
   ,118,133,252,133,2884
9B 4210 DATA 254,24,169,212,101
   ,254,133,254,160,0,162,17,17
   3,137,3,145,2198
62 4220 DATA 251,169,8,145,253,
   24,165,251,105,40,133,251,16
   5,252,105,0,2317
DF 4230 DATA 133,252,165,253,10
   5,40,133,253,165,254,105,0,1
   33,254,202,16,2463
9E 4240 DATA 219,96,44,5,43,5,4
   5,5,42,5,46,5,41,5,47,5,658
6C 4250 DATA 40,5,48,5,39,5,49,
   5,38,5,50,5,37,5,51,5,392
6F 4260 DATA 36,5,52,5,35,5,53,
   5,34,5,54,5,33,5,55,5,392
FE 4270 DATA 32,5,56,5,31,5,57,
   5,30,5,58,5,29,5,59,5,392
77 4280 DATA 28,5,60,5,27,5,61,
   5,26,5,62,5,25,5,63,5,392
66 4290 DATA 24,5,173,223,2,208
   ,38,141,140,3,169,6,141,5,21
   2,141,1631
BD 4300 DATA 6,212,141,210,2,16
   9,160,141,139,3,162,15,169,3
   2,157,236,1954
29 4310 DATA 5,157,20,6,157,60,
   6,202,16,244,142,223,2,173,1
   40,3,1556
EE 4320 DATA 141,33,208,173,139
   ,3,208,15,141,222,2,32,63,11
   8,173,222,1893
45 4330 DATA 2,240,3,141,19,3,9
   6,206,139,3,208,7,169,0,141,
   220,1597
5C 4340 DATA 2,240,218,206,210,
   2,208,238,169,6,141,5,212,14
   1,6,212,2216
4D 4350 DATA 141,210,2,162,0,14
   2,4,212,189,217,119,240,26,1
   57,22,6,1849
B5 4360 DATA 10,10,141,1,212,16
   9,17,141,4,212,173,140,3,41,
   7,73,1354
83 4370 DATA 7,157,22,218,232,2
   08,225,238,140,3,173,140,3,4
   1,15,141,1963
AB 4380 DATA 140,3,96,32,7,1,13
   ,5,32,32,15,22,5,18,32,0,453

9E 4390 DATA 169,168,133,251,16
   9,6,133,252,189,56,112,45,16
   ,208,240,7,2154
5F 4400 DATA 24,165,251,105,32,
   133,251,189,0,208,74,74,74,5
   6,233,3,1872
2B 4410 DATA 24,101,251,133,251
   ,165,252,105,0,133,252,224,0
   ,208,107,169,2375
BD 4420 DATA 202,160,41,209,251
   ,240,16,136,209,251,240,11,1
   60,42,209,251,2628
81 4430 DATA 240,5,136,209,251,
   208,82,169,32,145,251,136,14
   5,251,200,200,2660
EE 4440 DATA 145,251,169,0,141,
   251,3,141,252,3,141,236,216,
   141,237,216,2543
E8 4450 DATA 141,238,216,141,24
   7,2,141,4,212,169,9,141,5,21
   2,141,6,2025
6E 4460 DATA 212,169,17,141,4,2
   12,10,141,1,212,169,1,141,21
   6,2,169,1817
00 4470 DATA 5,141,253,3,162,2,
   24,189,236,4,125,251,3,201,5
   8,144,1801
65 4480 DATA 2,233,10,157,236,4
   ,202,16,238,96,160,41,169,16
   5,209,251,2189
04 4490 DATA 240,12,169,100,209
   ,251,240,6,169,166,209,251,2
   08,235,189,56,2710
13 4500 DATA 112,73,255,45,21,2
   08,141,21,208,169,0,157,64,3
   ,157,80,1714
62 4510 DATA 3,157,0,208,224,2,
   208,7,141,205,2,141,204,2,96
   ,224,1824
46 4520 DATA 14,208,198,141,214
   ,2,141,217,2,96,173,21,208,2
   40,42,162,2079
2D 4530 DATA 0,232,232,224,16,1
   76,34,189,56,112,44,21,208,2
   40,242,44,2070
0F 4540 DATA 16,208,208,27,56,1
   89,0,208,233,8,176,14,189,56
   ,112,73,1773
60 4550 DATA 255,45,21,208,141,
   21,208,209,216,96,157,0,208,
   176,210,56,2226
47 4560 DATA 189,0,208,233,8,17
   6,13,72,185,56.112.73.255.45
   ,16,208,1853
57 4570 DATA 141,16,208,104,157
   ,0,208,76,199,120,173,21,208
   ,240,65,162,2098
CB 4580 DATA 0,232,232,224,16,1
   76,57,189,56,112,44,21,208,2
   40,242,44,2093
67 4590 DATA 16,208,208,25,24,1
   89,0,208,105,8,144,11,72,173
   ,16,208,1615
BC 4600 DATA 29,56,112,141,16,2
   08,104,157,0,208,76,23,121,2
   4,189,0,1464
44 4610 DATA 208,105,8,144,12,1
   89,56,112,73,255,45,21,208,1
   41,21,208,1806
CD 4620 DATA 96,157,0,208,76,23
   ,121,173,203,2,208,37,206,63
   ,3,208,1784
D2 4630 DATA 32,162,4,142,63,3,
   56,189,207,4,233,1,201,48,17
   6,29,1550
E7 4640 DATA 72,160,4,185,207,4
   ,201,48,208,8,136,16,246,104
   ,140,221,1960
0B 4650 DATA 2,96,104,24,105,10
   ,157,207,4,202,16,218,96,157
   ,207,4,1609
5F 4660 DATA 96,0,0,0,0,0,0,0,1
   69,0,133,250,169,128,133,251
   ,1329
13 4670 DATA 169,198,133,174,13
   3,193,169,92,133,175,133,194
   ,169,216,133,252,2666
EB 4680 DATA 169,156,133,253,16
   0,0,177,250,145,174,230,250,
   208,2,230,251,2788
59 4690 DATA 230,174,208,2,230,
   175,165,250,197,252,208,234,
   165,251,197,253,3191
D3 4700 DATA 208,228,169,115,13
   3,187,169,157,133,188,169,3,
   133,183,169,0,2344
0A 4710 DATA 133,185,160,0,185,
   67,157,240,6,32,210,255,200,
   208,245,32,2315
51 4720 DATA 207,255,240,251,20
   1,49,240,4,201,56,48,230,41,
   15,133,186,2357
75 4730 DATA 76,234,245,147,17,
   17,73,78,80,85,84,32,68,69,8
   6,73,1464
FD 4740 DATA 67,69,32,78,85,77,
   66,69,82,13,17,67,65,83,61,4
   9,980
D5 4750 DATA 32,47,32,58,73,83,
   75,61,32,56,32,79,82,32,57,5
   8,899
AC 4760 DATA 45,32,0,87,84,52,0
   ,0,0,0,0,0,0,0,0,0,300
A4 4770 DATA 0,0,0,255,255,255,
   255,0,0,0,0,0,0,0,0,0,1020
```

Prefab Sprites

PROGRAM: SPT ED LOADER



Before typing this program in or running it you should enter the following :

```
POKE43,0:POKE44,32
POKE8191,0:NEW
```

When you RUN this program it will POKE the machine code into memory and then save your finished program on disk or cassette

```
E9 10 BL=357:LN=50:SA=2049
5B 20 FOR L=0 TO BL:CX=0:FOR D=
   0 TO 15:READ A:CX=CX+A:POKE
   SA+L*16+D.A:NEXT D
A7 25 POKE53280.A
A5 30 READ A:IF A><CX THENPRINT
   "ERROR IN LINE":LN+(L*10):ST
   OP
86 40 NEXT L
0B 50 DATA 0.8.195.7.158.50.48.
   54.55.32.84.73.77.66.79.0.98
   6
B6 60 DATA 0.0.169.0.32.104.27.
   169.5.32.210.255.169.147.32.
   210.1561
B0 70 DATA 255.169.160.160.0.15
   3.0.4.153.0.5.153.0.6.153.0.
   1371
2A 80 DATA 7.136.208.241.169.8.
   32.210.255.169.128.141.138.2
   .160.47.2051
3C 90 DATA 185.0.14.153.0.208.1
   36.16.247.169.13.141.248.7.1
   41.249.1927
E8 100 DATA 7.141.250.7.141.251
   .7.162.0.160.64.134.251.132.
   252.160.2119
8B 110 DATA 7.185.64.15.153.200
   .4.185.24.15.153.104.5.185.3
   2.15.1346
48 120 DATA 153.184.5.185.40.15
   .153.8.6.185.48.15.153.88.6.
   185.1429
1C 130 DATA 56.15.153.168.6.136
   .16.217.169.18.32.210.255.16
   2.6.160.1779
B9 140 DATA 20.24.32.240.255.16
   0.0.185.48.14.32.210.255.200
   .192.15.1882
D0 150 DATA 208.245.232.224.18.
   208.232.160.15.185.64.14.153
   .220.4.153.2335
8A 160 DATA 204.5.185.80.14.153
   .124.5.153.228.6.136.16.235.
   169.160.1873
E8 170 DATA 141.168.5.141.170.5
   .141.129.5.141.209.5.160.21.
   185.88.1714
22 180 DATA 15.153.9.4.169.7.15
   3.9.216.169.173.153.49.4.169
   .2.1454
AA 190 DATA 153.49.216.136.16.2
   32.32.242.8.169.1.141.168.2.
   76.128.1769
01 200 DATA 9.160.9.162.5.24.32
   .240.255.166.251.165.252.32.
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    205,189,2156
93  210 DATA 169,32,32,210,255,3
    2,210,255,32,210,255,32,210,
    255,173,28,2390
0D  220 DATA 208,240,13,160,7,18
    5,136,14,153,24,5,136,16,247
    ,208,11,1763
BA  230 DATA 160,7,185,144,14,15
    3,24,5,136,16,247,169,5,133,
    255,198,1851
16  240 DATA 255,164,255,16,1,96
    ,185,128,15,141,80,9,185,136
    ,15,141,1822
FF  250 DATA 104,9,141,120,9,185
    ,144,15,141,105,9,141,121,9,
    173,39,1465
F9  260 DATA 208,201,240,240,28,
    56,233,240,170,169,0,105,8,2
    02,208,251,2559
A7  270 DATA 168,162,0,185,151,1
    4,157,112,5,200,232,224,8,20
    8,244,240,2310
57  280 DATA 11,160,7,185,152,14
    ,153,112,5,136,16,247,76,48,
    9,120,1451
F6  290 DATA 169,199,141,169,2,3
    2,10,10,162,166,160,9,142,20
    ,3,140,1534
74  300 DATA 21,3,169,0,141,14,2
    20,169,241,141,26,208,88,169
    ,27,141,1778
60  310 DATA 17,208,76,27,10,169
    ,1,141,25,208,173,168,2,208,
    17,173,1623
84  320 DATA 169,2,141,22,208,16
    9,218,141,18,208,238,168,2,7
    6,129,234,2143
1D  330 DATA 169,200,141,22,208,
    169,210,141,18,208,206,168,2
    ,206,169,2,2239
E3  340 DATA 173,169,2,201,191,2
    40,3,76,49,234,169,199,141,1
    69,2,160,2178
C5  350 DATA 0,185,33,7,153,32,7
    ,200,192,40,208,245,173,220,
    27,73,1795
88  360 DATA 85,141,71,7,238,238
    ,9,173,238,9,208,3,238,239,9
    ,173,2079
FE  370 DATA 71,7,201,204,240,14
    ,76,49,234,169,184,141,238,9
    ,169,27,2033
63  380 DATA 141,239,9,96,32,10,
    10,76,49,234,120,169,52,133,
    1,165,1536
A2  390 DATA 251,141,45,10,165,2
    52,141,46,10,160,0,185,128,6
    2,153,64,1813
82  400 DATA 3,200,192,64,208,24
    5,169,55,133,1,88,32,242,8,3
    2,228,1900
00  410 DATA 255,240,251,201,43,
    208,14,165,251,24,105,64,133
    ,251,208,2,2415
D2  420 DATA 230,252,76,27,10,20
    1,45,208,14,165,251,56,233,6
    4,176,2,2010
50  430 DATA 198,252,133,251,76,
    27,10,201,219,208,11,230,252
    ,230,252,230,2780
E4  440 DATA 252,230,252,76,27,1
    0,201,221,208,11,198,252,198
    ,252,198,252,2838
E2  450 DATA 198,252,76,27,10,20
    1,49,208,15,238,39,208,238,4
    0,208,238,2245
C7  460 DATA 41,208,238,42,208,7
    6,60,10,201,33,208,15,206,39
    ,208,206,1999
78  470 DATA 40,208,206,41,208,2
    06,42,208,76,60,10,201,77,20
    8,8,169,1968
7D  480 DATA 255,141,28,208,76,6
    0,10,201,72,208,8,169,0,141,
    28,208,1813
F9  490 DATA 76,60,10,201,50,208
    ,6,238,37,208,76,60,10,201,3
    4,208,1683
FC  500 DATA 6,206,37,208,76,60,
    10,201,51,208,6,238,38,208,7
    6,60,1689
F5  510 DATA 10,201,35,208,6,206
    ,38,208,76,60,10,201,52,208,
    6,238,1763
26  520 DATA 33,208,76,60,10,201
    ,36,208,6,206,33,208,76,60,1
    0,201,1632
E2  530 DATA 53,208,6,238,32,208
    ,76,60,10,201,37,208,6,206,3
    2,208,1789
BC  540 DATA 76,60,10,201,136,20
    8,3,76,19,8,201,140,208,11,1
    69,0,1526
1C  550 DATA 141,17,209,169,147,
    32,210,255,0,201,82,208,31,1
    20,169,52,2042
04  560 DATA 171,1,166,251,164,2
    52,142,69,11,140,70,11,160,6
    3,185,64,1920
CE  570 DATA 3,73,255,153,0,64,1
    36,16,245,76,32,10,201,133,2
    08,14,1619
3F  580 DATA 160,63,185,64,3,153
    ,113,27,136,16,247,76,60,10,
    201,134,1648
BC  590 DATA 208,29,120,169,52,1
    33,1,166,251,164,252,142,120
    ,11,140,121,2079
CE  600 DATA 11,160,63,185,113,2
    7,153,0,64,136,16,247,76,32,
    10,201,1494
79  610 DATA 75,208,28,120,169,5
    2,133,1,166,251,164,252,169,
    0,142,152,2082
1C  620 DATA 11,140,153,11,160,6
    3,153,0,64,136,16,250,76,32,
    10,201,1476
C1  630 DATA 83,208,3,76,0,16,20
    1,76,208,3,32,13,18,201,13,2
    08,1359
A7  640 DATA 11,173,28,208,208,3
    ,76,107,20,76,201,23,201,213
    ,208,48,1804
6E  650 DATA 160,0,185,64,3,153,
    61,3,185,65,3,153,62,3,185,6
    6,1351
F4  660 DATA 3,153,63,3,200,200,
    200,192,64,144,231,173,61,3,
    141,124,1955
1E  670 DATA 3,173,62,3,141,125,
    3,173,63,3,141,126,3,76,177,
    25,1297
B2  680 DATA 76,206,25,0,141,17,
    208,169,255,205,18,208,208,2
    51,96,255,2338
69  690 DATA 255,255,255,255,255
    ,255,255,15,31,55,103,255,19
    9,199,112,254,3008
70  700 DATA 115,126,115,115,115
    ,126,0,63,115,112,112,112,11
    5,62,0,252,1655
E9  710 DATA 118,115,115,115,118
    ,124,0,126,115,112,124,112,1
    15,126,0,126,1661
B2  720 DATA 115,112,124,112,112
    ,112,0,62,115,112,119,115,11
    5,62,0,115,1502
F5  730 DATA 115,115,127,115,115
    ,115,0,60,28,28,28,28,28,28,
    0,126,1056
57  740 DATA 110,14,14,14,110,60
    ,0,115,118,124,124,118,115,1
    15,3,240,1394
6A  750 DATA 112,112,112,112,113
    ,127,0,115,119,127,107,107,9
    9,99,48,126,1635
11  760 DATA 115,115,115,115,115
    ,115,6,62,115,115,115,115,11
    5,62,0,254,1649
C7  770 DATA 211,179,126,112,112
    ,112,0,62,115,115,115,119,62
    ,7,0,254,1701
D7  780 DATA 115,115,126,118,115
    ,115,3,63,115,120,62,15,103,
    62,0,255,1502
D0  790 DATA 156,28,28,28,28,28,
    0,115,115,115,115,115,115,62
    ,0,115,1163
BA  800 DATA 115,115,115,115,62,
    28,0,115,115,115,107,93,119,
    99,0,115,1428
A5  810 DATA 54,28,28,54,115,115
    ,3,115,115,115,62,28,28,28,0
    ,127,1015
BE  820 DATA 7,14,28,56,112,127,
    0,60,48,48,48,48,48,60,0,12,
    716
EE  830 DATA 18,48,124,48,98,252
    ,0,60,12,12,12,12,12,60,0,0,
    768
3F  840 DATA 24,60,126,24,24,24,
    24,0,16,48,127,127,48,16,0,0
    ,688
51  850 DATA 0,0,0,0,0,0,0,24,24
    ,24,24,0,0,24,0,102,222
FA  860 DATA 102,68,0,0,0,0,0,10
    2,102,255,102,255,102,102,0,
    24,1214
25  870 DATA 62,96,60,6,124,24,0
    ,98,102,12,24,48,102,70,0,60
    ,888
25  880 DATA 102,60,56,103,102,6
    3,0,6,12,24,0,0,0,0,0,14,542
1F  890 DATA 56,112,112,112,56,1
    4,0,112,28,14,14,14,28,112,0
    ,0,784
9A  900 DATA 102,60,231,60,102,0
    ,0,0,24,24,126,24,24,0,0,0,7
    77
12  910 DATA 0,0,0,0,24,24,48,0,
    255,255,0,0,0,0,0,0,606
89  920 DATA 0,0,0,0,24,24,0,3,7
    ,14,28,56,112,96,0,62,426
0E  930 DATA 115,119,123,115,115
    ,62,0,28,60,28,28,28,28,127,
    0,62,1038
7B  940 DATA 103,15,30,60,120,12
    7,0,62,103,7,30,7,103,62,0,1
    5,844
89  950 DATA 31,55,103,127,7,7,0
    ,127,112,126,7,7,103,62,0,63
    ,937
BF  960 DATA 112,126,115,115,115
    ,62,0,127,103,14,28,28,28,28
    ,0,62,1063
DE  970 DATA 115,115,62,115,115,
    62,0,62,103,103,63,7,103,62,
    0,0,1087
83  980 DATA 0,28,0,0,28,0,0,0,0
    ,28,0,0,28,28,56,14,210
61  990 DATA 24,48,96,48,24,14,0
    ,0,0,126,0,126,0,0,0,112,618
96  1000 DATA 24,12,6,12,24,112,
    0,62,103,7,14,28,0,28,0,192,
    624
78  1010 DATA 100,244,100,192,15
    0,244,150,0,0,0,0,0,0,0,0,0,
    1180
A2  1020 DATA 0,111,209,0,255,20
    0,12,19,121,240,0,255,10,240
    ,79,0,1751
01  1030 DATA 0,241,242,243,6,14
    ,3,3,3,3,0,0,0,0,0,180,938
61  1040 DATA 32,32,32,170,32,18
    0,32,32,32,32,32,32,32,170,3
    2,207,1111
F6  1050 DATA 247,247,247,208,24
    7,207,247,247,247,247,247,24
    7,247,208,160,206,3706
BF  1060 DATA 239,239,239,250,23
    9,206,239,239,239,239,239,23
    9,239,250,160,0,3495
11  1070 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,192,192
E9  1080 DATA 192,224,224,240,25
    2,255,255,255,255,252,240,22
    4,224,192,192,255,3731
A5  1090 DATA 255,63,15,7,7,3,3,
    141,149,140,148,137,160,143,
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       142,136,1649
46     1100 DATA 137,146,133,147,16
       0,143,142,130,140,129,131,13
       9,160,160,160,151,2308
DF     1110 DATA 136,137,148,133,16
       0,160,160,146,133,132,160,16
       0,160,160,160,131,2376
A4     1120 DATA 153,129,142,160,16
       0,160,160,144,149,146,144,14
       0,133,160,160,135,2375
5A     1130 DATA 146,133,133,142,16
       0,160,160,130,140,149,133,16
       0,160,160,160,153,2379
33     1140 DATA 133,140,140,143,15
       1,160,160,143,146,129,142,13
       5,133,160,160,130,2305
A3     1150 DATA 146,143,151,142,16
       0,160,160,144,137,142,139,16
       0,160,160,160,132,2396
E3     1160 DATA 146,139,160,135,14
       6,129,153,141,133,132,160,13
       5,146,129,153,140,2277
6D     1170 DATA 148,160,135,146,13
       3,133,142,140,148,160,130,14
       0,149,133,160,140,2297
6F     1180 DATA 148,160,135,146,12
       9,153,160,131,143,140,143,14
       9,146,160,160,141,2344
C3     1190 DATA 149,140,148,137,16
       0,177,160,141,149,140,148,13
       7,160,178,160,144,2428
1C     1200 DATA 129,144,133,146,16
       0,160,160,130,143,146,132,13
       3,146,160,160,140,2322
36     1210 DATA 143,131,129,148,13
       7,143,142,0,0,0,0,0,0,0,0,3,
       976
2C     1220 DATA 3,3,3,3,3,3,3,148,
       137,141,130,143,167,147,160,
       147,1341
EE     1230 DATA 144,146,137,148,13
       3,160,133,132,137,148,143,14
       6,161,160,160,0,2188
3F     1240 DATA 0,0,0,0,0,0,0,0,0,
       0,0,0,0,255,255,39,549
AB     1250 DATA 37,38,33,32,0,0,0,
       112,192,16,96,176,0,0,0,5,73
       7
E2     1260 DATA 5,6,6,6,0,0,0,132,
       133,150,137,131,133,160,160,
       192,1351
45     1270 DATA 192,192,192,192,19
       2,192,192,148,129,144,133,16
       0,160,160,160,132,2670
BD     1280 DATA 137,147,139,160,16
       0,160,160,255,255,0,0,0,0,0,
       0,144,1717
6D     1290 DATA 146,133,147,147,16
       0,129,142,153,160,139,133,15
       3,0,0,0,3,1745
FB     1300 DATA 3,7,7,15,63,255,25
       5,129,132,132,146,133,147,14
       7,160,147,1878
1E     1310 DATA 148,129,146,148,16
       0,160,160,133,142,132,160,16
       0,160,160,160,0,2258
6A     1320 DATA 0,0,126,126,0,0,0,
       134,137,140,133,142,129,141,
       133,120,1461
4E     1330 DATA 169,0,141,17,208,1
       69,5,32,210,255,169,147,32,2
       10,255,169,2188
20     1340 DATA 160,160,0,153,0,4,
       153,0,5,153,0,6,153,0,7,136,
       1090
F2     1350 DATA 208,241,169,0,141,
       21,208,162,49,160,234,142,20
       ,3,140,21,1919
4C     1360 DATA 3,169,240,141,26,2
       08,169,1,141,14,220,169,200,
       141,22,208,2072
B4     1370 DATA 160,7,185,224,15,1
       53,0,4,185,232,15,153,22,4,1
       85,248,1792
4D     1380 DATA 15,153,102,4,185,2
       16,15,153,6,4,153,26,4,185,1
       52,15,1388

34     1390 DATA 153,80,4,185,168,1
       5,153,87,4,136,16,214,169,27
       ,141,17,1569
60     1400 DATA 208,169,32,133,250
       ,133,251,162,0,160,14,24,32,
       240,255,162,2225
8B     1410 DATA 0,165,250,32,205,1
       89,169,32,32,210,255,32,228,
       255,240,251,2545
0A     1420 DATA 201,43,208,11,165,
       250,201,254,240,241,230,250,
       76,120,16,201,2707
00     1430 DATA 45,208,11,165,250,
       201,32,240,226,198,250,76,12
       0,16,201,13,2252
AC     1440 DATA 208,217,165,250,10
       5,175,133,253,166,250,232,13
       4,251,134,254,162,3089
28     1450 DATA 0,160,34,24,32,240
       ,255,162,0,165,251,32,205,18
       9,169,32,1950
28     1460 DATA 32,210,255,32,228,
       255,240,251,201,43,208,15,16
       5,251,201,255,2842
18     1470 DATA 240,241,197,253,24
       0,237,230,251,76,192,16,201,
       45,208,11,165,2803
07     1480 DATA 251,197,254,240,22
       2,198,251,76,192,16,201,13,2
       08,213,169,0,2701
BA     1490 DATA 133,72,133,74,165,
       250,133,73,169,32,133,75,120
       ,169,52,133,1916
42     1500 DATA 1,160,0,177,72,145
       ,74,200,208,249,230,73,230,7
       5,165,73,2132
A6     1510 DATA 197,251,208,237,16
       9,55,133,1,88,32,228,255,240
       ,251,201,32,2578
D6     1520 DATA 208,35,173,87,4,20
       1,148,240,14,160,7,185,168,1
       5,153,87,1885
53     1530 DATA 4,136,16,247,76,42
       ,17,160,7,185,176,15,153,87,
       4,136,1461
F5     1540 DATA 16,247,76,42,17,20
       1,13,208,208,169,160,160,8,1
       53,111,4,1793
B7     1550 DATA 136,16,250,162,2,1
       60,31,24,32,240,255,169,9,13
       3,88,32,1739
46     1560 DATA 228,255,240,251,20
       1,20,240,225,201,13,240,22,3
       2,210,255,198,2831
1B     1570 DATA 88,165,88,208,234,
       32,228,255,240,251,201,20,24
       0,203,201,13,2667
C2     1580 DATA 208,243,160,8,185,
       111,4,233,64,153,168,2,136,1
       6,245,162,2098
79     1590 DATA 4,160,0,24,32,77,1
       9,169,54,133,1,173,87,4,201,
       148,1286
B9     1600 DATA 208,5,162,1,76,186
       ,17,162,8,169,3,160,255,32,1
       86,255,1885
AB     1610 DATA 165,88,162,168,160
       ,2,32,189,255,169,32,133,73,
       169,72,166,2035
D6     1620 DATA 74,164,75,32,216,2
       55,169,55,133,1,169,160,160,
       0,153,120,1936
7E     1630 DATA 4,136,208,250,160,
       12,185,192,15,153,174,4,136,
       16,247,32,1924
D7     1640 DATA 228,255,240,251,76
       ,19,8,32,240,255,160,9,185,1
       68,2,201,2329
81     1650 DATA 96,208,5,169,32,15
       3,168,2,136,16,241,96,120,16
       9,0,141,1752
F0     1660 DATA 17,208,169,5,32,21
       0,255,169,147,32,210,255,169
       ,160,160,0,2198
44     1670 DATA 153,0,4,153,0,5,15
       3,0,6,153,0,7,136,208,241,16
       9,1388

E3     1680 DATA 0,141,21,208,162,4
       9,160,234,142,20,3,140,21,3,
       169,240,1713
84     1690 DATA 141,26,208,169,1,1
       41,14,220,169,200,141,22,208
       ,160,7,185,2012
A7     1700 DATA 152,15,153,1,4,185
       ,168,15,153,8,4,185,248,15,1
       53,20,1479
9E     1710 DATA 4,136,16,235,169,2
       7,141,17,208,32,228,255,240,
       251,201,32,2192
98     1720 DATA 208,35,173,8,4,201
       ,148,240,14,160,7,185,168,15
       ,153,8,1727
CF     1730 DATA 4,136,16,247,76,10
       6,18,160,7,185,176,15,153,8,
       4,136,1447
24     1740 DATA 16,247,76,106,18,2
       01,13,208,208,169,160,160,9,
       153,29,4,1777
A1     1750 DATA 136,16,250,162,0,1
       60,29,24,32,240,255,169,10,1
       33,88,32,1736
3E     1760 DATA 228,255,240,251,20
       1,20,240,225,201,13,240,22,3
       2,210,255,198,2831
63     1770 DATA 88,165,88,208,234,
       32,228,255,240,251,201,20,24
       0,203,201,13,2667
AA     1780 DATA 208,243,160,9,24,1
       85,29,4,233,63,153,168,2,136
       ,16,244,1877
95     1790 DATA 162,2,160,1,24,32,
       248,17,169,11,229,88,133,88,
       173,8,1545
9B     1800 DATA 4,201,148,208,30,1
       62,1,169,18,32,210,255,160,0
       ,185,217,2000
16     1810 DATA 240,32,210,255,200
       ,192,17,208,245,169,69,32,21
       0,255,169,144,2647
07     1820 DATA 76,22,19,162,8,169
       ,1,160,1,32,186,255,165,88,1
       62,168,1674
22     1830 DATA 160,2,32,189,255,1
       69,144,32,210,255,169,0,32,2
       13,255,169,2286
7E     1840 DATA 160,160,0,153,81,4
       ,136,208,250,160,12,185,192,
       15,153,94,1963
9C     1850 DATA 4,136,16,247,32,22
       8,255,240,251,76,19,8,32,248
       ,17,169,1978
02     1860 DATA 10,229,88,133,88,9
       6,240,101,24,101,240,138,24,
       138,0,120,1770
13     1870 DATA 169,0,141,17,208,1
       69,255,205,18,208,208,251,16
       2,49,160,234,2454
35     1880 DATA 142,20,3,140,21,3,
       169,240,141,26,208,169,1,141
       ,14,220,1658
35     1890 DATA 169,147,32,131,25,
       169,160,160,0,153,0,4,153,0,
       5,153,1461
6D     1900 DATA 0,6,136,208,244,15
       3,0,7,200,192,232,208,248,16
       0,10,140,2144
CC     1910 DATA 16,208,185,87,19,1
       53,0,208,136,16,247,160,25,1
       69,128,153,1910
9D     1920 DATA 0,4,153,112,7,169,
       7,153,0,216,153,112,219,136,
       16,237,1694
74     1930 DATA 169,158,32,210,255
       ,24,162,22,160,0,32,240,255,
       169,64,32,1984
21     1940 DATA 210,255,160,25,32,
       240,255,169,64,32,210,255,20
       2,16,233,169,2527
D9     1950 DATA 5,32,210,255,169,2
       7,141,17,208,160,0,185,66,3,
       72,185,1735
8F     1960 DATA 65,3,72,185,64,3,1
       62,7,74,72,176,8,169,204,157
       ,168,1589
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F2  1970 DATA 2,76,10,20,169,128
    ,157,168,2,104,202,16,235,10
    4,162,7,1562
62  1980 DATA 74,72,176,8,169,20
    4,157,176,2,76,34,20,169,128
    ,157,176,1798
91  1990 DATA 2,104,202,16,235,1
    04,162,7,74,72,176,8,169,204
    ,157,184,1876
4C  2000 DATA 2,76,58,20,169,128
    ,157,184,2,104,202,16,235,16
    2,23,189,1727
CC  2010 DATA 168,2,157,41,4,202
    ,16,247,173,68,20,24,105,40,
    141,68,1476
02  2020 DATA 20,201,39,176,3,23
    8,69,20,200,200,200,192,63,2
    08,140,162,2131
41  2030 DATA 4,160,41,142,69,20
    ,140,68,20,96,32,96,19,169,0
    ,160,1236
D3  2040 DATA 63,153,192,3,136,1
    6,250,169,255,141,192,3,141,
    213,3,169,2099
99  2050 DATA 129,141,195,3,141,
    198,3,141,201,3,141,204,3,14
    1,207,3,1854
FB  2060 DATA 141,210,3,162,32,1
    60,58,142,8,208,140,9,208,16
    9,15,141,1806
28  2070 DATA 252,7,169,0,133,30
    ,133,31,238,43,208,32,228,25
    5,240,248,2247
85  2080 DATA 201,29,208,31,230,
    30,165,30,201,24,208,11,169,
    0,133,30,1700
68  2090 DATA 169,32,141,8,208,2
    08,9,24,173,8,208,105,8,141,
    8,208,1658
29  2100 DATA 76,169,20,201,157,
    208,29,198,30,165,30,16,11,1
    69,23,133,1635
4B  2110 DATA 30,169,216,141,8,2
    08,208,9,56,173,8,208,233,8,
    141,8,1824
7F  2120 DATA 208,76,169,20,201,
    17,208,31,230,31,165,31,201,
    21,208,11,1828
1D  2130 DATA 169,0,133,31,169,5
    8,141,9,208,208,9,24,173,9,2
    08,105,1654
B9  2140 DATA 8,141,9,208,76,169
    ,20,201,145,208,29,198,31,16
    5,31,16,1655
99  2150 DATA 11,169,20,133,31,1
    69,218,141,9,208,208,9,56,17
    3,9,208,1772
ED  2160 DATA 233,8,141,9,208,76
    ,169,20,201,13,208,55,169,0,
    141,17,1668
30  2170 DATA 208,169,255,205,18
    ,208,208,251,160,16,185,0,14
    ,153,0,208,2258
A7  2180 DATA 136,16,247,169,147
    ,32,210,255,169,160,160,0,15
    3,0,4,153,2011
37  2190 DATA 0,5,153,0,6,136,20
    8,244,153,0,7,200,192,232,20
    8,248,1992
3B  2200 DATA 76,59,22,201,42,20
    8,94,169,253,164,31,24,105,3
    ,136,16,1603
4C  2210 DATA 250,133,29,165,30,
    201,8,144,10,230,29,56,233,8
    ,133,28,1687
88  2220 DATA 76,134,21,168,166,
    29,189,64,3,136,16,4,9,128,2
    08,44,1395
D4  2230 DATA 136,16,4,9,64,208,
    37,136,16,4,9,32,208,30,136,
    16,1061
4F  2240 DATA 4,9,16,208,23,136,
    16,4,9,8,208,16,136,16,4,9,8
    22
65  2250 DATA 4,208,9,136,16,4,9
    ,2,208,2,9,1,157,64,3,32,864
33  2260 DATA 234,19,76,169,20,2
    01,32,208,94,169,253,164,31,
    24,105,3,1802
80  2270 DATA 136,16,250,133,29,
    165,30,201,8,144,10,230,29,5
    6,233,8,1678
6A  2280 DATA 133,28,76,232,21,1
    68,166,29,189,64,3,136,16,4,
    41,127,1433
7B  2290 DATA 208,44,136,16,4,41
    ,191,208,37,136,16,4,41,223,
    208,30,1543
79  2300 DATA 136,16,4,41,239,20
    8,23,136,16,4,41,247,208,16,
    136,16,1487
77  2310 DATA 4,41,251,208,9,136
    ,16,4,41,253,208,2,41,254,15
    7,64,1689
77  2320 DATA 3,32,234,19,76,169
    ,20,76,169,20,120,169,52,133
    ,1,165,1458
BB  2330 DATA 251,141,80,22,165,
    252,141,81,22,160,0,185,64,3
    ,153,0,1720
EF  2340 DATA 64,200,192,64,208,
    245,169,55,133,1,88,76,96,8,
    120,169,1888
34  2350 DATA 0,141,17,208,169,2
    55,205,18,208,208,251,162,49
    ,160,234,142,2427
B0  2360 DATA 20,3,140,21,3,169,
    240,141,26,208,169,1,141,14,
    220,169,1685
89  2370 DATA 158,32,210,255,169
    ,147,32,210,255,169,160,160,
    0,153,0,4,2114
95  2380 DATA 153,0,5,153,0,6,13
    6,208,244,153,0,7,200,192,23
    2,208,1897
4C  2390 DATA 248,160,10,140,16,
    208,185,87,19,153,0,208,136,
    16,247,169,2002
41  2400 DATA 128,160,25,153,0,4
    ,153,112,7,136,16,247,24,162
    ,22,160,1509
86  2410 DATA 0,32,240,255,169,6
    4,32,210,255,160,25,32,240,2
    55,169,64,2202
89  2420 DATA 32,210,255,202,16,
    233,169,5,32,210,255,169,27,
    141,17,208,2181
64  2430 DATA 160,0,185,66,3,72,
    185,65,3,72,185,64,3,162,7,7
    4,1306
E8  2440 DATA 72,176,8,169,204,1
    57,168,2,76,1,23,169,128,157
    ,168,2,1680
FF  2450 DATA 104,202,16,235,104
    ,162,7,74,72,176,8,169,204,1
    57,176,2,1868
E2  2460 DATA 76,25,23,169,128,1
    57,176,2,104,202,16,235,104,
    162,7,74,1660
37  2470 DATA 72,176,8,169,204,1
    57,184,2,76,49,23,169,128,15
    7,184,2,1760
16  2480 DATA 104,202,16,235,162
    ,22,189,168,2,201,204,240,36
    ,189,169,2,2141
F4  2490 DATA 201,204,240,12,173
    ,38,208,157,192,2,157,193,2,
    76,119,23,1997
E3  2500 DATA 173,39,208,157,192
    ,2,157,193,2,169,128,157,169
    ,2,76,119,1943
A9  2510 DATA 23,189,169,2,201,2
    04,240,14,173,37,208,157,192
    ,2,157,193,2161
81  2520 DATA 2,169,128,157,168,
    2,202,202,16,188,162,23,189,
    168,2,157,1935
E0  2530 DATA 41,4,189,192,2,157
    ,41,216,202,16,241,173,129,2
    3,24,105,1755
BC  2540 DATA 40,141,129,23,201,
    39,176,3,238,130,23,173,135,
    23,24,105,1603
7A  2550 DATA 40,141,135,23,201,
    39,176,3,238,136,23,200,200,
    200,192,63,2010
3A  2560 DATA 208,19,162,4,160,4
    1,142,130,23,140,129,23,140,
    135,23,162,1641
DD  2570 DATA 216,142,136,23,96,
    76,227,22,32,95,22,169,0,160
    ,63,153,1632
74  2580 DATA 192,3,136,16,250,1
    69,255,141,192,3,141,213,3,1
    41,193,3,2051
59  2590 DATA 141,214,3,169,128,
    141,195,3,141,198,3,141,201,
    3,141,204,2026
C0  2600 DATA 3,141,207,3,141,21
    0,3,169,1,141,196,3,141,199,
    3,141,1702
12  2610 DATA 202,3,141,205,3,14
    1,208,3,141,211,3,162,32,160
    ,58,142,1815
5B  2620 DATA 8,208,140,9,208,16
    9,15,141,252,7,169,0,133,30,
    133,31,1653
56  2630 DATA 169,15,141,28,208,
    238,43,208,32,228,255,240,24
    8,201,29,208,2491
84  2640 DATA 31,230,30,165,30,2
    01,12,208,11,169,0,133,30,16
    9,32,141,1592
F9  2650 DATA 8,208,208,9,24,173
    ,8,208,105,16,141,8,208,76,3
    8,24,1462
7C  2660 DATA 201,157,208,29,198
    ,30,165,30,16,11,169,11,133,
    30,169,208,1765
E9  2670 DATA 141,8,208,208,9,56
    ,173,8,208,233,16,141,8,208,
    76,38,1739
AC  2680 DATA 24,201,17,208,31,2
    30,31,165,31,201,21,208,11,1
    69,0,133,1681
94  2690 DATA 31,169,58,141,9,20
    8,208,9,24,173,9,208,105,8,1
    41,9,1510
47  2700 DATA 208,76,38,24,201,1
    45,208,29,198,31,165,31,16,1
    1,169,20,1570
A5  2710 DATA 133,31,169,218,141
    ,9,208,208,9,56,173,9,208,23
    3,8,141,1954
0B  2720 DATA 9,208,76,38,24,201
    ,13,208,3,76,61,21,76,228,24
    ,169,1435
FB  2730 DATA 253,164,31,24,105,
    3,136,16,250,133,29,165,30,2
    01,4,144,1688
F0  2740 DATA 10,230,29,56,233,4
    ,133,28,76,206,24,168,166,29
    ,189,64,1645
60  2750 DATA 3,136,96,201,50,20
    8,39,32,192,24,16,6,41,63,9,
    64,1180
DF  2760 DATA 208,22,136,16,6,41
    ,207,9,16,208,13,136,16,6,41
    ,243,1324
5C  2770 DATA 9,4,208,4,41,252,9
    ,1,157,64,3,32,225,22,201,49
    ,1281
F2  2780 DATA 208,39,32,192,24,1
    6,6,41,63,9,128,208,22,136,1
    6,6,1146
69  2790 DATA 41,207,9,32,208,13
    ,136,16,6,41,243,9,8,208,4,4
    1,1222
24  2800 DATA 252,9,2,157,64,3,3
    2,225,22,201,51,208,31,32,19
    2,24,1505
D5  2810 DATA 16,4,9,192,208,16,
    136,16,4,9,48,208,9,136,16,4
    ,1031
6E  2820 DATA 9,12,208,2,9,3,157
    ,64,3,32,225,22,201,32,208,3
    1,1218
B2  2830 DATA 32,192,24,16,4,41,
    63,208,16,136,16,4,41,207,20
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    8,9,1217
28  2840 DATA 136,16,4,41,243,20
    8,2,41,252,157,64,3,32,225,2
    2,76,1522
2D  2850 DATA 38,24,32,210,255,1
    62,41,160,216,142,152,25,140
    ,153,25,160,1935
58  2860 DATA 21,173,39,208,162,
    24,157,153,219,202,16,250,17
    3,152,25,24,1998
57  2870 DATA 105,40,141,152,25,
    201,39,176,3,238,153,25,136,
    16,226,96,1772
E4  2880 DATA 120,169,52,133,1,1
    66,251,164,252,142,198,25,14
    0,199,25,160,2197
81  2890 DATA 63,185,64,3,153,0,
    64,136,16,247,76,32,10,201,1
    96,208,1654
41  2900 DATA 46,173,124,3,141,6
    1,3,173,125,3,141,62,3,173,1
    26,3,1360
42  2910 DATA 141,63,3,160,63,18
    5,61,3,153,64,3,185,62,3,153
    ,65,1367
B8  2920 DATA 3,185,63,3,153,66,
    3,136,136,136,16,233,76,177,
    25,201,1612
C6  2930 DATA 86,208,23,173,191,
    9,201,129,208,8,169,49,141,1
    91,9,76,1871
76  2940 DATA 24,26,169,129,141,
    191,9,76,32,10,201,204,208,5
    2,160,63,1695
EE  2950 DATA 185,64,3,42,185,66
    ,3,42,153,66,3,185,65,3,42,1
    53,1260
88  2960 DATA 65,3,185,64,3,42,1
    53,64,3,136,136,136,16,226,1
    73,28,1433
C4  2970 DATA 208,240,12,230,2,1
    65,2,201,1,240,211,169,0,133
    ,2,76,1892
21  2980 DATA 177,25,201,210,208
    ,52,160,63,185,66,3,106,185,
    64,3,106,1814
8B  2990 DATA 153,64,3,185,65,3,
    106,153,65,3,185,66,3,106,15
    3,66,1379
7B  3000 DATA 3,136,136,136,16,2
    26,173,28,208,240,12,230,2,1
    65,2,201,1914
CC  3010 DATA 1,240,211,169,0,13
    3,2,76,177,25,201,89,208,59,
    162,0,1753
A7  3020 DATA 160,60,185,64,3,72
    ,189,64,3,153,64,3,104,157,6
    4,3,1348
D5  3030 DATA 185,65,3,72,189,65
    ,3,153,65,3,104,157,65,3,185
    ,66,1383
B8  3040 DATA 3,72,189,66,3,153,
    66,3,104,157,66,3,136,136,13
    6,232,1525
47  3050 DATA 232,232,224,33,208
    ,204,76,177,25,201,88,208,11
    6,160,63,169,2416
92  3060 DATA 0,133,2,185,66,3,7
    2,162,7,185,64,3,72,104,42,7
    2,1172
72  3070 DATA 165,2,106,133,2,20
    2,16,245,153,66,3,169,0,133,
    2,162,1559
10  3080 DATA 7,104,104,42,72,16
    5,2,106,133,2,202,16,245,153
    ,64,3,1420
D4  3090 DATA 104,169,0,133,2,13
    3,63,162,7,185,65,3,41,15,72
    ,104,1258
A3  3100 DATA 42,72,165,2,106,13
    3,2,202,16,245,104,162,7,185
    ,65,3,1511
A5  3110 DATA 41,240,72,104,42,7
    2,165,63,106,133,63,202,16,2
    45,101,2,1667
3B  3120 DATA 153,65,3,104,136,1
    36,136,16,150,173,18,208,208
    ,251,76,177,2010
35  3130 DATA 25,201,61,208,31,1
    73,28,208,240,26,160,63,185,
    64,3,72,1748
15  3140 DATA 41,170,74,133,2,10
    4,41,85,10,101,2,153,64,3,13
    6,16,1135
56  3150 DATA 235,76,177,25,76,6
    3,10,32,245,11,169,129,141,1
    91,9,96,1685
F7  3160 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
DD  3170 DATA 0,0,0,0,0,0,0,0,25
    0,139,140,34,218,82,34,171,1
    068
93  3180 DATA 146,34,138,82,34,1
    39,140,0,0,0,0,0,0,0,0,0,713

29  3190 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,88,88
A2  3200 DATA 0,0,0,0,0,0,0,194,
    208,217,214,218,216,208,245,
    193,1913
DD  3210 DATA 218,245,193,220,21
    6,215,218,242,198,245,217,21
    2,193,208,198,193,3431
3F  3220 DATA 245,198,197,199,22
    0,193,208,245,208,209,220,19
    3,218,199,245,245,3442
B1  3230 DATA 245,245,245,245,24
    5,245,245,245,245,245,245,24
    5,245,245,245,245,3920
DF  3240 DATA 245,245,245,245,24
    5,245,245,245,245,245,245,24
    5,245,245,245,245,3920
57  3250 DATA 245,245,245,245,24
    5,245,245,193,221,208,245,22
    2,208,204,198,245,3659
D1  3260 DATA 212,199,208,245,25
    4,245,220,219,214,199,208,21
    6,208,219,193,245,3504
C1  3270 DATA 198,197,199,220,19
    3,208,245,245,245,171,245,20
    9,208,214,199,208,3404
9D  3280 DATA 216,208,219,193,24
    5,198,197,199,220,193,208,24
    5,245,245,198,221,3450
7F  3290 DATA 254,245,220,219,21
    4,199,208,216,208,219,193,24
    5,228,227,245,198,3538
54  3300 DATA 197,199,220,193,20
    8,198,245,245,245,198,221,17
    1,245,209,208,214,3416
A2  3310 DATA 199,208,216,208,21
    9,193,245,228,227,245,198,19
    7,199,220,193,208,3403
B6  3320 DATA 198,245,245,245,21
    6,245,216,192,217,193,220,21
    4,218,217,218,192,3491
37  3330 DATA 199,245,245,245,22
    1,245,221,220,171,199,208,19
    8,245,245,245,199,3551
A2  3340 DATA 245,199,208,195,20
    8,199,198,208,245,245,245,21
    1,228,245,216,208,3503
B0  3350 DATA 216,218,199,220,20
    7,208,245,245,245,211,230,24
    5,199,208,214,212,3522
F5  3360 DATA 217,217,245,245,24
    5,205,245,205,171,211,217,22
    0,197,245,245,245,3575
02  3370 DATA 204,245,204,171,21
    1,217,220,197,245,245,245,19
    8,221,245,192,245,3505
1A  3380 DATA 198,214,199,218,21
    7,217,245,192,197,245,245,24
    5,198,221,245,209,3505
82  3390 DATA 245,198,214,199,21
    8,217,217,245,209,218,194,21
    9,245,245,245,198,3526
44  3400 DATA 221,245,217,245,19
    8,214,199,218,217,217,245,21
    7,208,211,193,245,3510
D8  3410 DATA 245,245,198,221,24
    5,199,245,198,214,199,218,21
    7,217,245,199,220,3525
0F  3420 DATA 210,221,193,245,24
    5,245,217,245,217,218,212,20
    9,245,245,245,198,3610
2C  3430 DATA 245,198,212,195,20
    8,245,245,245,222,245,222,22
    0,217,217,245,245,3626
FC  3440 DATA 245,195,245,198,19
    7,208,208,209,245,245,245,22
    8,171,224,245,220,3528
33  3450 DATA 219,214,199,208,21
    6,208,219,193,245,214,218,21
    7,218,192,199,198,3377
8C  3460 DATA 245,245,245,198,22
    1,245,228,171,224,245,209,20
    8,214,199,208,216,3521
B9  3470 DATA 208,219,193,245,21
    4,218,217,218,192,199,198,24
    5,245,245,232,245,3533
D4  3480 DATA 208,196,192,212,21
    7,220,207,208,245,214,218,21
    7,218,192,199,198,3361
EA  3490 DATA 245,245,245,199,20
    8,193,192,199,219,245,208,21
    9,193,208,199,198,3415
30  3500 DATA 245,218,199,245,21
    7,208,212,195,208,198,245,20
    8,209,220,193,218,3438
72  3510 DATA 199,245,245,245,19
    2,198,208,245,214,199,198,19
    9,245,222,208,204,3466
64  3520 DATA 198,245,193,218,24
    5,216,218,195,208,245,220,21
    9,245,208,209,220,3502
4F  3530 DATA 193,218,199,245,24
    5,245,255,245,197,217,218,19
    3,198,245,197,218,3528
89  3540 DATA 220,219,193,245,22
    0,219,245,221,220,171,199,20
    8,198,245,245,245,3513
BE  3550 DATA 228,171,230,245,19
    7,217,218,193,198,245,214,21
    8,217,218,192,199,3400
41  3560 DATA 245,228,171,230,24
    5,220,219,245,216,192,217,19
    3,220,245,245,245,3576
9A  3570 DATA 198,197,212,214,20
    8,245,192,219,197,217,218,19
    3,245,245,245,211,3456
31  3580 DATA 226,245,199,208,17
    1,199,192,219,245,208,209,22
    0,193,218,199,245,3396
53  3590 DATA 245,245,211,237,24
    5,196,192,220,193,245,245,24
    5,245,245,245,245,3699
25  3600 DATA 245,245,245,245,24
    5,245,245,245,245,245,245,24
    5,245,245,245,245,3920
33  3610 DATA 245,245,245,245,24
    5,245,245,245,245,245,245,24
    5,245,245,245,245,3920
B9  3620 DATA 245,153,0,0,0,0,0,
    0,0,0,0,0,0,0,0,398
6D  4000 REM ** GET READY TO SAV
    E PROGRAM **
C6  4010 PRINT"PRESS ANY KEY TO
    SAVE PROGRAM"
30  4020 GETK$:IFK$=""THEN4020
DC  4030 POKE43,1:POKE44,8:POKE4
    5,85:POKE46,30
21  4040 SAVE "SPRITE EDITOR",8
56  4050 REM CHANGE ,8 ABOVE TO
    ,1 IF USING TAPE
```

+4 AU

PROGRAM: +4 AUTORUN

```
10 REM..AUTORUN BY TERRY WILKS.O
Z.1988..
20 COLOR0,2,2:COLOR4,2,2
```

```
30 PRINT"(CLR)(GRY3)":CHAR,11,6,
"[redacted] "
40 CHAR,11,7,"(RVS)     AUTORUN
  (GRN)(OFF)▌(GRY3)"
50 CHAR,11,8,"(RVS)
  (GRN)(OFF)▌(GRY3)"
60 CHAR,11,9,"(RVS)    TAZ..1988
  (GRN)(OFF)▌(GRY3)"
70 CHAR,11,10,"(RVS)
  (GRN)(OFF)▌"
80 CHAR,11,11,"▪(RVS)[redacted](OFF)▪(BLK)"
90 FORI=0TO1000:NEXTI
100 PRINT"(CLR)BASIC OR MACHINE
PROGRAM [B/M] ?"
110 DO:GETZ$:LOOPUNTILZ$="B"ORZ$
="M"
120 IFZ$="B"THENPRINT"(CLR)":POK
E232,0:GOTO350:ELSEPOKE232,1
130 TP$=""
140 PRINT"(CLR)":INPUT"START ADD
RESS FOR SAVE,[H/D]";SA$,TP$:IFT
P$=""THENGOSUB510
150 IFTP$="H"THENSA=DEC(SA$):ELS
ESA=VAL(SA$):TP$=""
160 GOSUB520:IFAGTHEN140
170 PRINT:INPUT"END ADDRESS FOR
SAVE,[H/D]";EA$,TP$:IFTP$=""THEN
GOSUB510
180 IFTP$="H"THENEA=DEC(EA$):ELS
EEA=VAL(EA$):TP$=""
190 IFEA<SATHENPRINT:PRINT"END A
DDRESS LESS THAN START : RE-ENTE
R":GOTO170
200 GOSUB530:IFAGTHEN140
210 PRINT:INPUT"START ADDRESS FO
R RUN,[H/D]";SR$,TP$:IFTP$=""THE
NGOSUB510
220 IFTP$="H"THENSR=DEC(SR$):ELS
ESR=VAL(SR$)
230 IFSR>EAORSR<SATHENPRINT"(CLR
)START ADDRESS OUTSIDE CODE":ELS
E270
240 PRINT:PRINT"RE-ENTER START A
DDRESS [Y/N] ?"
250 GOSUB610
260 IFA$="Y"THENPRINT"(CLR)":GOT
O210
270 SH=INT(SA/256):SL=SA-(SH*256
):EH=INT(EA/256):EI=EA-(EH*256)
280 RH=INT(SR/256):RL=SR-(RH*256
)
290 POKE212,SL:POKE213,SH:POKE21
4,EI+1:POKE215,EH:POKE764,RL:POK
E765,RH
300 PRINT"(CLR)START OF CODE:",S
A,"[$"HEX$(SA)"]"
310 PRINT:PRINT"END OF CODE  :",
EA,"[$"HEX$(EA)"]"
320 PRINT:PRINT"RUN FOR CODE :",
SR,"[$"HEX$(SR)"]"
330 PRINT:PRINT:PRINT"ARE THESE
ADDRESSES CORRECT [Y/N] ?"
340 GOSUB610:IFA$="N"THEN140
350 PRINT"(CLR)ENTERING CODE":LN
=1000:FORI=1525TO1615STEP8:CK=0:
FORJ=0TO7:READA
360 POKEI+J,A:CK=CK+A:NEXTJ:READ
A:IFCK<>ATHENPRINT"ERROR IN LINE
"LN:STOP
370 LN=LN+10:NEXTI
380 IFZ$="M"THENRESTORE3000:LN=3
000:ELSELN=2000
390 FORI=1615TO1693STEP8:CK=0:FO
RJ=0TO7:READA
400 POKEI+J,A:CK=CK+A:NEXTJ:READ
A:IFCK<>ATHENPRINT"ERROR IN LINE
"LN:STOP
410 LN=LN+10:NEXTI:PRINT"(CLR)(B
LU)"
420 CHAR,6,8,"TO CREATE AN AUTOR
UN PROGRAM"
430 CHAR,7,10,"LOAD YOUR PROGRAM
 AND TYPE"
440 CHAR,8,14,"(RED)┌────────────
──────────┐"
450 CHAR,8,15,"|(ORNG)SYS(1525)"
:PRINTCHR$(34)"FILENAME"CHR$(34)
"|"
460 CHAR,8,16,"└────────────
──────────┘"
470 FORI=0TO1500:NEXTI
480 FORI=0TO10:PRINTCHR$(27)"V":
NEXTI
490 POKE2022,4:PRINT"(CLR)(BLK)"
500 NEW
510 INPUT"DATA TYPE [H/D]":TP$:R
ETURN
520 IF(SA>=1525ANDSA<=1688)OR(SA
>=661ANDSA<=744)THEN600:ELSEAG=0
:RETURN
530 IF(EA>=1525ANDEA<=1688)OR(EA
>=661ANDEA<=744)THEN600
540 IF(SA<=1525ANDEA>=1525)OR(SA
<=661ANDEA>=661)THEN600
550 IFSA<4096ORSA>64767THENPRINT
T"(CLR)OPERATING SYSTEM RAM CORR
UPTED [Y/N] ?":ELSEAG=0:RETURN
560 GOSUB610:IFA$="N"THENAG=0:RE
TURN
570 PRINT"(CLR)DO YOU WISH TO QU
IT THIS PROGRAM [Y/N] ?"
580 GOSUB610:IFA$="N"THENAG=1:RE
TURN
590 PRINT"(CLR)":END
560 GOSUB610:IFA$="N"THENAG=0:RE
TURN
570 PRINT"(CLR)DO YOU WISH TO QU
610 DO:GETA$:LOOPUNTILA$="Y"ORA$
="N":RETURN
1000 DATA 32,238,168,162,149,160
,2,142, 1053
1010 DATA 2,3,140,3,3,134,208,13
2, 625
1020 DATA 209,162,4,160,3,134,21
0,132, 1014
1030 DATA 211,162,77,189,79,6,15
7,149, 1030
1040 DATA 2,202,16,247,169,1,170
,160, 967
1050 DATA 3,32,186,255,169,0,133
,154, 932
1060 DATA 169,208,166,210,164,21
1,32,216, 1376
1070 DATA 255,162,18,160,135,142
,2,3, 877
1080 DATA 140,3,3,169,0,32,189,2
55, 791
1090 DATA 165,232,240,10,169,212
,166,214, 1408
1100 DATA 164,215,32,216,255,96,
32,222, 1232
1110 DATA 167,96,0,0,0,0,0,0, 26
3
2000 DATA 169,16,141,21,255,141,
25,255, 1023
2010 DATA 141,59,5,162,18,160,13
5,142, 822
2020 DATA 2,3,140,3,3,162,47,160
, 520
2030 DATA 226,142,38,3,140,39,3,
169, 760
2040 DATA 0,133,154,32,213,255,1
69,1, 957
2050 DATA 170,168,32,186,255,169
,0,32, 1012
2060 DATA 189,255,32,213,255,134
,45,134, 1257
2070 DATA 47,134,49,132,46,132,4
8,132, 720
2080 DATA 50,32,241,138,32,154,1
38,169, 954
2090 DATA 128,133,129,76,220,139
,0,0, 825
3000 DATA 169,16,141,21,255,141,
25,255, 1023
3010 DATA 141,59,5,162,18,160,13
5,142, 822
3020 DATA 2,3,140,3,3,162,47,160
, 520
3030 DATA 226,142,38,3,140,39,3,
162, 753
3040 DATA 0,160,128,134,154,132,
129,138, 975
3050 DATA 32,213,255,169,1,170,1
68,32, 1040
3060 DATA 186,255,169,0,32,189,2
55,32, 1118
3070 DATA 213,255,108,252,2,0,0,
0, 830
3080 DATA0,0,0,0,0,0,0,0, 0
3090 DATA0,0,0,0,0,0,0,0, 0
```

Minibase

PROGRAM: MINIBASE

```
10 clr:let pntr=0
20 rem ** main menu **
30 color 0,1:color 4,1:scnclr
40 print"(clr)(down)(down)(grn)
        1. create new file"
50 print"(down)              2. load
 existing file"
60 print"(down)              3. dele
te a file"
70 print"(down)              4. disp
lay directory"
80 print"(down)              5. rena
me a file"
90 print"(down)              6. clea
nup disk"
100 print"(down)              7. cop
y a file"
110 print"(down)              8. vie
w resident file"
120 print"(down)              9. era
se resident file"
130 if pntr=0 then print"(down)
        a. printer output on"
140 if pntr=1 then print"(down)
        a. printer output off"
150 print"(down)              b. sav
e resident file"
160 get a$
170 if a$=""then 160
180 if a$="1"then 590
190 if a$="2"then 1680
200 if a$="3"then 1540
210 if a$="4"then 540
220 if a$="5"then 340
230 if a$="6"then 310
240 if a$="7"then clr:let cp=1:g
oto 1680
250 if a$="8"and nr<>0 then 2380
:else260
260 if a$="9"then clr:goto30
270 if a$="a"and pntr=0 then let
 pntr=1:goto 30
280 if a$="a"and pntr=1 then let
 pntr=0:close2:goto 30
290 if a$="b"then goto 1210
300 sound1,32000,4:goto 160
310 rem ** cleanup a disk **
320 collect
330 goto 30
340 rem ** rename a file **
350 print"(clr)(lblu)enter name
of file to be renamed(lred)(down
)"
360 open 1,0
370 input#1,name$
380 close1
390 if name$="**"then goto 30
400 if len(name$)<1orlen(name$)>
16 then goto 340
410 print"(clr)(lblu)enter new n
ame(lred)(down)"
420 open 1,0
```

```
430 input#1,nname$
440 close1
450 if nname$="**"then goto 30
460 if len(nname$)<1orlen(nname$
)>16 then goto 340
470 scnclr:rename(name$)to(nname
$)
480 if ds<>0 then gosub 3310:els
e goto 30
490 get a$
500 if a$=""then goto 490
510 if a$=" "then goto 470
520 if a$="c"then goto 340
530 goto 30
540 rem ** display directory **
550 scnclr:catalog
560 get a$
570 if a$=""then goto 560
580 goto 30
590 rem ** create a file **
600 clr:print"(clr)(lblu)enter f
ilename(lred)(down)"
610 open1,0
620 input#1,name$
630 close1
640 if name$="**"then goto 30
650 let z=len(name$)
660 if z<1 or z>14 then 590
670 print"(clr)(lblu)enter numbe
r of records(lblu)(down)"
680 open1,0
690 input#1,nr$
700 close1
710 if nr$="**"then goto 30
720 let nr=val(nr$)
730 if nr<1 or nr>1000 then 670
740 print"(clr)(gry3)enter numbe
r of fields(lblu)(down)"
750 open 1,0
760 input#1,nf$
770 close1
780 if nf$="**"then goto 30
790 let nf=val(nf$)
800 if nf<1 or nf>20 then 740
810 dim namef$(nf)
820 for x=1 to nf
830 print"(clr)(gry2)input name
of field ";:print x:print"(lred)
"
840 open1,0
850 input#1,namef$(x)
860 close1
870 if namef$(x)="**"then goto 3
0
880 if len(namef$(x))<1 or len(n
ame$(x))>30 then color 4,3:sound
1,32000,4:color4,1:goto 830
890 next x
900 let y=1
910 dim inf$(nf*nr)
920 dim rec$(nr):scnclr
930 for z=1 to nr
940 for x=(z*nf-(nf)+1)to(z*nf)
950 print"(clr)(gry3)record ";:p
rint z
960 print"(home)(down)(down)";:p
rint namef$(y):print"(grn)"
970 open1,0
980 input#1,inf$(x)
990 close1
1000 if inf$(x)="**"then goto 30
1010 if inf$(x)=""then let inf$(
x)=" - "
1020 if len(inf$(x))>40 then col
or4,3:sound1,32000,4:color4,1:go
to950
1030 color5,11:char1,12,24,"corr
ect ? (y/n)"
1040 get a$
1050 if a$=""then goto 1040
1060 if a$="n"then goto 950
1070 if a$="y"then goto 1090
1080 goto 1040
1090 let y=y+1
1100 next x:y=1
1110 next z
1120 print"(clr)(lblu)save file
? (y/n)"
1130 get a$
1140 if a$=""then 1130
1150 if a$="y"then 1210
1160 scnclr:sound1,32000,4:sound
1,32000,4:sound1,32000,4:char1,2
,11,"(lred)are you sure you (grn
)don't (lred)want to save?"
1170 char1,17,13,"(y/n)"
1180 get a$
1190 if a$=""then 1180
1200 if a$="y"then goto 30
1210 dopen#1,(name$),d0,u8,w
1220 if ds=0 then goto 1450
1230 sound1,32000,4:let e=ds:let
e$=ds$:dclose#1
1240 open15,8,15:print#15,"i0":c
lose15
1250 print"(clr)(lblu)disk error
"
1260 print"(lred)————————"
1270 print"(grn)(down)dos error
="
1280 print"(down)(down)(yel)";:p
rinte$
1290 print"(down)(down)(grn)plea
se check disk."
1300 print"(down)(down)(down)(gr
n)press (lred)space (grn)for ret
ry,"
1310 print"(down)(down)(down)(gr
n)press (lred)c (grn)to change n
ame,"
1320 print"(down)(down)(down)(gr
n)or (lred)any (grn)other key to
 abort (lred)save(grn)"
1330 get a$
1340 if a$=""then goto 1330
1350 if a$=" "then 1210
1360 if a$="c"then goto 1380
1370 goto 30
1380 print"(clr)(lblu)enter file
name (down)(lred)"
1390 open1,0
1400 input#1,name$
1410 close1
1420 if name$="**"then goto30
1430 if len(name$)<1 or len(name
$)>16 then 1380
1440 goto 1210
1450 print#1,nr
1460 print#1,nf
1470 for a=1 to nf
1480 print#1,namef$(a)
1490 next a
1500 for a=1 to (nr*nf)
1510 print#1,inf$(a)
1520 next a
1530 dclose#1:goto 30
1540 rem ** delete a file **
1550 scnclr
1560 print"(clr)(lblu)enter file
name(lred)(down)"
1570 open1,0
1580 input#1,name$
1590 close1
1600 if name$="**"then goto 30
1610 if len(name$)<1 or len(name
$)>16then 1560
1620 scnclr:char1,13,12,"are you
 sure?",0:sound1,40000,8:sound 1
,40000,8:sound 1,40000,8
1630 get a$
1640 if a$=""then goto 1630
1650 if a$<>"y"then goto 30
1660 scratch(name$)
1670 goto 30
1680 rem ** load a file **
1690 scnclr:poke4864,pntr:poke48
66,cp:clr:letpntr=peek(4864):let
 cp=peek(4866)
1700 if pntr=1 then open2,4:prin
t#2,chr$(31)
1710 print"(clr)(lblu)enter file
name(lred)(down)"
1720 open1,0
1730 input#1,name$
1740 close1
1750 if name$="**"then goto 30
1760 if len(name$)<1 or len(name
$)>16then 1710
1770 dopen#1,(name$),d0,u8,r
1780 if ds=0 then goto 1940
1790 sound1,32000,4:let e=ds:let
e$=ds$:dclose#1
1800 open15,8,15:print#15,"i0":c
lose15
1810 print"(clr)(lblu)disk error
"
1820 print"(lred)————————"
1830 print"(grn)(down)dos error
="
1840 print"(down)(down)(yel)";:p
rinte$
1850 print"(down)(down)(grn)plea
se check disk."
1860 print"(down)(down)(down)(gr
n)press (lred)space (grn)for ret
ry,"
1870 print"(down)(down)(down)(gr
n)press (lred)c (grn)to change n
ame,"
1880 print"(down)(down)(down)(gr
n)or (lred)any (grn)other key to
 exit (lred)'read'(grn) mode"
1890 get a$
1900 if a$=""then goto 1890
1910 if a$=" "then goto 1770
1920 if a$="c"then goto 1680
1930 run
1940 input#1,nr
1950 input#1,nf
1960 dim inf$((nr*nf)):dimnamef$
(nf)
1970 for a=1 to nf
1980 input#1,namef$(a)
1990 next a
2000 for b=1 to (nr*nf)
2010 input#1,inf$(b)
2020 next b:dclose#1
2030 if cp<>1 then goto 2090
2040 scnclr
2050 color 5,6:char1,09,12,"pres
s any key to save"
2060 get a$
2070 if a$=""then goto 2060
2080 goto 1210
2090 if nr<10 then let t=1
2100 if nr<100 and nr>9 then let
 t=2
2110 if nr<1000 and nr>99 then l
et t=3
2120 if nf<=10 then let u=1
2130 if nf>9 then let u=2
2140 print"(clr)(lblu)file param
eters"
2150 if pntr=1 then print#2,"fil
e parameters"
2160 print"(lred)————————————
"
2170 if pntr=1 then print#2,"——
————————"
2180 print"(down)(grn)filename
          :(lblu)";:printname
$
2190 if pntr=1 then print#2,"fil
ename                : ";:print#
2,name$
2200 print"(down)(grn)no.of reco
rds       :(lblu)";:letnr$=st
r$(nr):printright$(nr$,t)
2210 if pntr=1 then print#2,"no.
 of records           :";:print#2
,nr
2220 print"(down)(grn)no.of fiel
ds per record:(lblu)";:letnf$=st
r$(nf):printright$(nf$,u)
2230 if pntr=1 then print#2,"no.
 of fields per record:";:print#2
,nf:print#2,"(down)"
2240 print"(rght)(rght)(rght)(do
wn)(down)(down)(down)(down)(down
)(down)(lblu)press (lred)any (lb
lu)key for list of fields."
```

```
2250 get a$
2260 if a$=""then goto 2250:else
 2270
2270 print"(clr)(lred)field no.
     (lblu)field name(grn)(down)
"
2280 if pntr=1 then print#2,"fie
ld no.      field name"
2290 for a=1 to nf
2300 if a<10 then print"(rght)(r
ght)";:printa;:print"(rght)(rght
)(rght)(rght)(rght)";:print name
f$(a)
2310 if pntr=1 and a<10 then pri
nt#2,"  ";:print#2,a;:print#2,"
  ";:print#2,namef$(a)
2320 if a>9 then print"(rght)(rg
ht)";:printa;:print"(rght)(rght)
(rght)(rght)";:printnamef$(a)
2330 if pntr=1 and a>9 then prin
t#2,"  ";:print#2,a;:print#2,"
  ";:print#2,namef$(a)
2340 next a
2350 char 1,7,23,"(lred)press an
y key to continue"
2360 get a$
2370 if a$=""then 2360
2380 rem ** sub-menu **
2390 print"(clr)(grn)(down)(down
)(down)(down)(down)(down)(down)(
down)(rght)(rght)(rght)(rght)(rg
ht)(rght)(rght)1. view a particu
lar record"
2400 print"(down)(rght)(rght)(rg
ht)(rght)(rght)(rght)(rght)2. pr
intout/hardcopy"
2410 print"(down)(rght)(rght)(rg
ht)(rght)(rght)(rght)(rght)3. se
arch records"
2420 print"(down)(rght)(rght)(rg
ht)(rght)(rght)(rght)(rght)4. am
end a file"
2430 print"(down)(rght)(rght)(rg
ht)(rght)(rght)(rght)(rght)5. ex
it to main menu"
2440 let cg=peek(4866):get a$
2450 if a$=""then 2440
2460 if a$="1"then 2530
2470 if a$="2"then 2970
2480 if a$="3"and cg=1 then 2760
2490 if a$="3"and cg<>1 then 274
0
2500 if a$="4"then goto 3400
2510 if a$="5"then goto 30
2520 goto 2440
2530 print"(clr)(lred)enter reco
rd number(lblu)(down)"
2540 open1,0
2550 input#1,a$
2560 close1:v=0
2570 if a$="**"then goto 30
2580 let a=val(a$)
2590 if a<1 or a>nr then color4,
11:sound1,32000,4:color4,1:goto
2380
2600 scnclr:letc=1:let f=1:for b
=(a*nf-(nf-1))to(a*nf)
2610 :color5,6:printnamef$(f):co
lor5,15:printinf$(b)
2620 let c=c+2
2630 if c>=22 then letv=v+1:goto
 2650
2640 letf=f+1:next b:goto 2710
2650 char1,3,24,"(lred)press any
 key to continue display"
2660 get a$
2670 if a$=""then2660
2680 if v>1thenv=0:goto2380
2690 letc=1:scnclr:goto2640
2700 end
2710 char1,14,24,"(lred)press an
y key"
2720 get a$
2730 if a$=""then2720:else goto
2380
2740 if cg=1 then 2760
2750 scnclr:dimsh$(nf):let cg=1:
poke4866,cg
2760 for b=1 to nf
2770 print"(clr)(lblu)enter sear
ch data for field(down)(down)(gr
n)"
2780 print b;:print" (lred)(";:p
rintnamef$(b);:print")(grn)(down
)(down)"
2790 open1,0
2800 input#1,sh$(b)
2810 close1
2820 if sh$(b)="**"then goto 30
2830 next b:scnclr
2840 for c=1 to nf
2850 let a=c
2860 for b=1 to nr
2870 if pntr=1 and sh$(c)=inf$((
b*nf-(nf)+c))then print#2,namef$
(c);:print#2," : ";:print#2,sh$(
c);:print#2," =":print#2,"record
";:print#2,b
2880 if sh$(c)=inf$((b*nf-(nf)+c
))then color5,15:printnamef$(c);
:print"(yel) : (lred)";:printsh$
(c);:print" =(grn)":print"record
";:printb
2890 next b
2900 next c
2910 print
2920 color5,11:char1,13,24,"pres
s any key"
2930 get a$
2940 if a$=""then goto 2930
2950 goto 2380
2960 end
2970 scnclr
2980 print"(grn)(lred)     enter
record number to be printed":pri
nt"(down)                  or
              ":print"(down)
enter '@' to print whole file(lb
lu)"
2990 print
3000 open1,0
3010 input#1,a$
3020 close1
3030 if a$="**"then goto 30
3040 if a$="@"then 3160
3050 let a=val(a$)
3060 if a<1 or a>nr then goto 29
70
3070 open 1,4:print#1,chr$(31)
3080 print#1,chr$(10)chr$(14)nam
e$chr$(15)chr$(10)
3090 let c=1
3100 for b=(a*nf-(nf)+1)to(a*nf)
3110 print#1,namef$(c)
3120 print#1,inf$(b)
3130 let c=c+1:next b
3140 print#1,chr$(159):close1
3150 goto 2380
3160 open 1,4:print#1,chr$(031)
3170 print#1,chr$(10)chr$(14)nam
e$chr$(15)chr$(10)
3180 let c=1
3190 let d=1
3200 for b=1 to (nr*nf)
3210 print#1,namef$(c)
3220 print#1,inf$(b)
3230 let d=d+1
3240 if d>nf then let d=1:print#
1,chr$(8)chr$(13)chr$(15)
3250 let c=c+1
3260 if c>nf then let c=1
3270 next b
3280 print#1,chr$(159):close1
3290 goto 2380
3300 end
3310 color4,3:sound1,32000,4:col
or4,1:print"(clr)(lblu)disk erro
r"
3320 print"(lred)______________"
3330 print"(grn)(down)dos error
="
3340 print"(down)(down)(yel)";:p
rintds$
3350 print"(down)(down)(grn)plea
se check disk."
3360 print"(down)(down)(down)(gr
n)press (lred)space (grn)for ret
ry,"
3370 print"(down)(down)(down)(gr
n)press (lred)c (grn)to change n
ame,"
3380 print"(down)(down)(down)(gr
n)or (lred)any (grn)other key to
 abort (grn)"
3390 close1:return
3400 rem ** amend record **
3410 scnclr
3420 print"(grn)enter number of
record to be amended (lred)(down
)"
3430 open1,0
3440 input#1,a$
3450 close1
3460 if a$="**"then goto 30
3470 leta=val(a$)
3480 ifa<1ora>nrthengoto3400
3490 let y=0
3500 for x=(a*nf-nf+1)to(a*nf):l
ety=y+1
3510 print"(clr)(grn)record(lred
)";:printa;:print"(grn),field(lr
ed)";:printy
3520 print:print"(grn)( (lblu)";
:printnamef$(y);:print"(grn) )"
3530 print:print"(grn)data : (lr
ed)":print:printinf$(x)
3540 char1,13,24,"amend ? (y/n)"
3550 get a$
3560 if a$="n"then goto 3590
3570 if a$="y"then goto 3610
3580 goto 3550
3590 scnclr:next x
3600 if am=1 then goto 3720:else
 goto 2380
3610 scnclr
3620 print"(clr)(grn)enter new d
ata for record(lred)";:printa;:p
rint"(grn),field(lred)";:printy
3630 print:print"(grn)( (lblu)";
:printnamef$(y);:print" )"
3640 print:print"(lred)"
3650 open 1,0
3660 input#1,inf$(x)
3670 close1
3680 if inf$(x)="**"then goto 20
3690 if len(inf$(x))>40 then got
o 3610
3700 if len(inf$(x))<1 then let
inf$(x)="-"
3710 let am=1:goto 3590
3720 print"(clr)(lblu)save file
? (y/n)"
3730 get a$
3740 if a$=""then 3730
3750 if a$="y"then 3810
3760 scnclr:sound1,32000,4:sound
1,32000,4:sound1,32000,4:char1,2
,11,"(lred)are you sure you (grn
)don't (lred)want to save?"
3770 char 1,17,13,"(y/n)"
3780 get a$
3790 if a$=""then goto 3780
3800 if a$="y"then goto 2380
3810 dopen#1,(name$),d0,u8,w
3820 if ds=0 then goto 1450
3830 gosub 3310
3840 get a$
3850 if a$=""then goto 3840
3860 if a$=" "then goto 3810
3870 if a$="c"then goto 3890
3880 goto 2380
3890 scnclr
3900 color5,11:print"(clr)enter
new name(down)(lblu)"
3910 open1,0
3920 input#1,name$
3930 close1
3940 if name$="**"then goto 30
3950 if len(name$)<1 or len(name
$)>16 then goto 3890
3960 goto 3810
```

MAIL ORDER ADVERTISING

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Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

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MUSIC

MIDI PRODUCTS

MERRY CHRISTMAS TO ALL OUR ADVERTISERS AND READERS

COPY DEADLINE FOR MARCH ISSUE IS 19TH DECEMBER

B R E A K

Have you entered one of our recent competitions?
Could you have won a MIDI guitar or a robot arm?
Read on and find out.

Competition Winners

In our August 1988 edition, we gave you the chance to one of ten winners of products from Trilogic.
Roy Beaufoy of Rugby is the lucky winner of an Expert cartridge, voice digitiser and a Datasette Doctor.
The following have all won their choice of either a Voice Digitiser or a Datasette Doctor:
G.G.Brown, Washington, Tyne & Wear.
G.Renton, Ryde, Isle of Wight.
D.Parish, West Wickham.
D.Cook, Carleton, Blackpool
P.T.Collins, Mynachoy, Cardiff.
P.Wognum, Felmores, Basildon.
S.W.Smith, Sittingbourne.
J.F. Hansen-Brown, Crookham, Aldershot.
R.Hitch, Newstead.

In September we teamed up with Casio to give you a chance to win a DG-20 guitar synthesizer. Mr Cathal Mooney from New Ross in Ireland will no doubt be annoying the neighbours with some strange noises from his prize.

October gave you the chance to be the proud owner of a Datel Robot Arm and all associated software. Mr Chris Garbutt from Basildon will no doubt have great fun with his prize.

The following runners-up will all receive a copy of the *Blazing Paddles* graphics package:

D. Heasley, Artane, Dublin.
M.Treacy, Doon, Ireland.
M.Le-Vallois, Paisley.
Mark Skingle, Basingstoke.

The relevant companies have been give the names and addresses of the prize winners. Prizes will be sent out by them.

Program Corrections

The mad knifeman certainly seems to have attacked the listings with some ferocity in our November 1988 issue. The programs MONSTER LDR and WT2.BAS both have a section of their listings missing. You will find the offending lines reproduced here.

You may like to know that the knifeman responsible for loosing the relevant information is no longer allowed to use anything sharper than a dessert spoon.

MONSTER LDR

```
3600 DATA 153,153,129,153,17,255
,3,129,153,153,131,153,1,255,3,1
29,1970
```

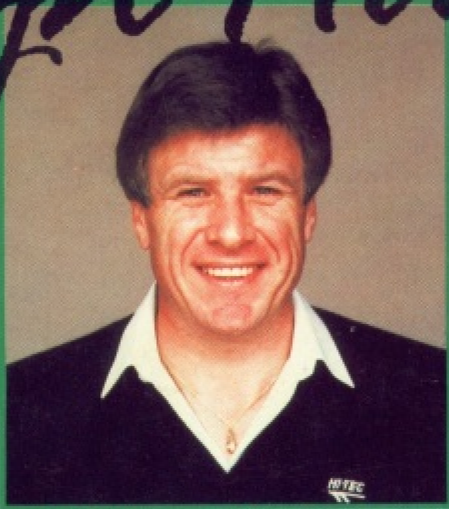
WILLIAM TELL (WT2.BAS)

```
2370 DATA 47,47,47,47,47,47,47,0
,0,0,0,0,0,0,0,0,329
```

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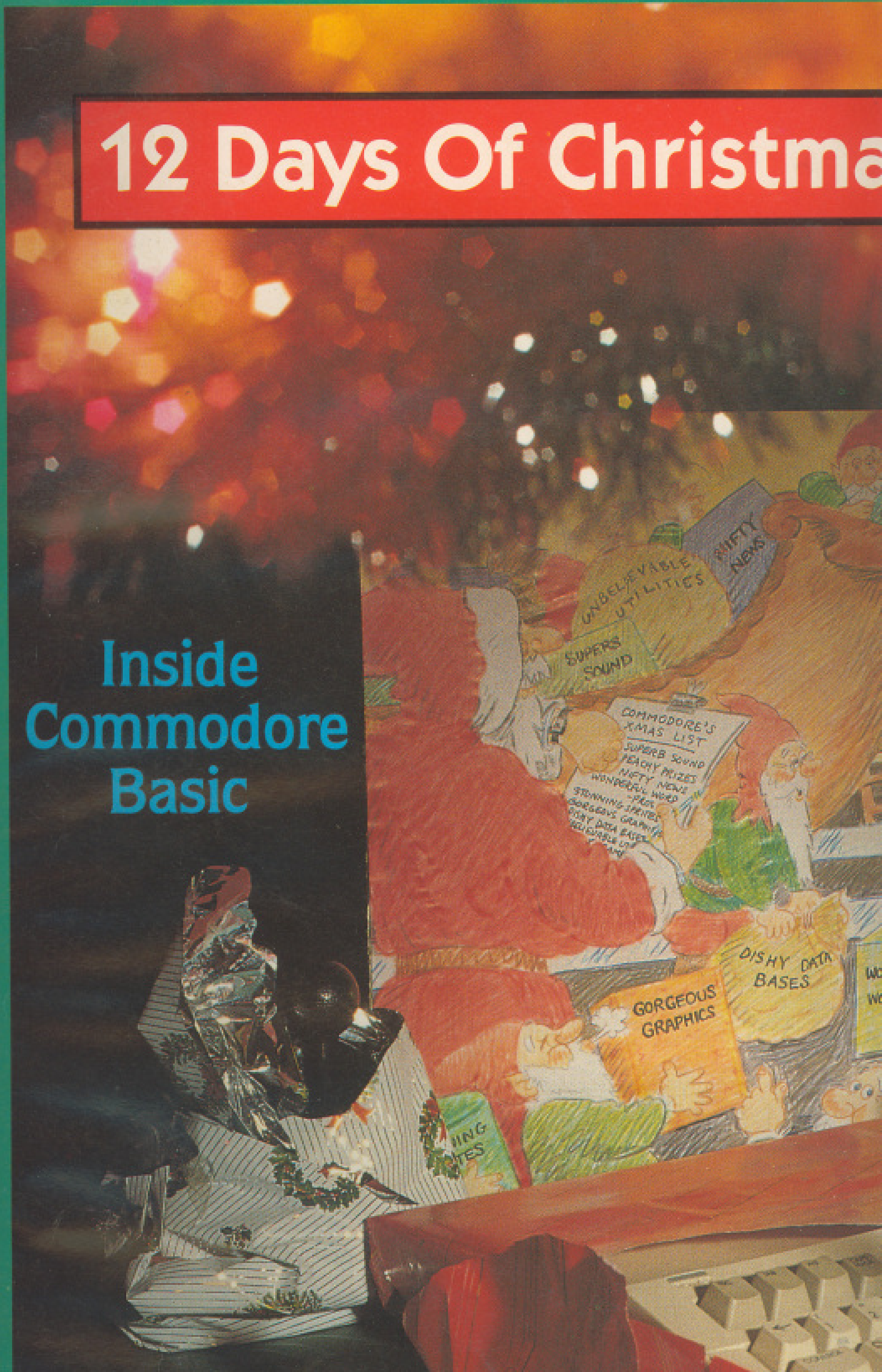


Your Commodore January 1989

Volume 5 Number 4

YOUR

COMMO...



12 Days Of Christma...

Inside Commodore Basic

BEST OF 1988

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